

MATERIALS TOWARD A MONOGRAPH OF THE GENUS VERBENA. XXIX

Harold N. Moldenke

VERBENA L.

Additional synonymy: Canadea Patermann, Beitr. Zytol. Verbenac. 13, 43, & [54], pl. 1, fig. 1 & 2. 1935.

Additional & emended bibliography: Ruling, Ord. Nat. Pl. 56. 1774; L. C. Rich., Act. Soc. Hist. Nat. Paris 1: 105. 1792; Ann. Mus. Hist. Nat. Paris 15: pl. 14, fig. 1-5. 1810; Kunth, Ind. Sem. Hort. Berol. 1845: 7. 1845; Clos, Ann. Sci. Nat., ser. 3, 10: 378-381. 1848; Schlecht., Ann. Sci. Nat., ser. 3, 14: 342-344. 1850; Schlecht., Linnaea 23: 714-722. 1850; R. A. Phil., Anal. Univ. Chil. 35: 190-192. 1870; Jönsson, Bot. Notiser 6: 169-187. 1881; Gilland, Rev. Hortie. 53: 348. 1881; Hieron., Bol. Acad. Nac. Córdoba 4: 407-409. 1881; Hieron., Pl. Diaph. Fl. Argent. 213-215. 1882; Cockerell, Canad. Ent. 28: 158. 1896; Cockerell & Porter, Ann. Mag. Nat. Hist. (7) 4: 412. 1899; Cockerell & Atkins, Ann. Mag. Nat. Hist. (7): 10: 44. 1902; Crawford, Canad. Ent. 34: 240. 1902; Charany, Journ. de Chim., ser. 7, 2: 292-298. 1910; Lond. Chem. Soc. Journ. 98: 991. 1910; Chem. Abstr. 5: 2525. 1911; Robertson, Ent. News 25: 72. 1914; Rau & Rau, Journ. Anim. Behavior 6: 368. 1916; Alvarez, Fl. Santiago del Estero 106. 1919; Kanda, Bot. Gaz. 69: 54-71, pl. 6-9. 1920; Robertson, Psyche 29: 171. 1922; Rau, Trans. Acad. Sci. St. Louis 24 (7): 22. 1922; Schnarf, Ost. Bot. Zeitschr. 74: 40-45. 1925; Schnarf in Linsb., Handb. Pflanzenanat. 10 (2): 64, 123, 233, 345, 380, & 688. 1929; Schwencke, Zytol. Untersuch. Verbenac. 3-15, 17-27, & 31. 1931; Patermann, Beitr. Zytol. Verbenac. 6-8, 10, 13-14, 43, 47, & [54], pl. 1, fig. 1 & 2. 1935; Bider, Beitr. Pharmakog. Borag. 95-100 & 120, pl. 7, fig. 1. 1935; Oppenheimer & Evenari, Bull. Soc. Bot. Genève. 31: 363. 1941; Oppenheimer & Evenari, Florul. Cisiord. 363. 1948; Parks & King, El Crisol [Puerto Rico] 4: 74-80. 1950; Chem. Abstr. 45: 3037. 1951; Muesebeck, Krombein, & Townes, U. S. Dept. Agr. Agric. Monog. 2 [Hymenop. N. Am.]. 1951; H. C. Greene, Am. Midl. Nat. 48: 37-54. 1952; H. C. Greene, Biol. Abstr. 27: 1885. 1953; Acevedo de Vargas, Rev. Chil. Hist. Nat. 54: 45. 1954; Moldenke, Biol. Abstr. 27: 984, 2026, & 3121. 1953; Spector, Handb. Biolog. Data 186, 394, 395, & 508. 1956; Santapau, Fl. Purandhar 103, 104, & 158. 1957; Algonquin Prov. Park Mus. Check-list 19. 1957; Muñoz Pizarro, Sin. Fl. Chil. 199-200, pl. 96 c-e & 97. 1959; Reitz, Sellowia 11: 45, 57, 79, & 134-135 (1959) and 12: 152 & 157. 1960; G. Rzedowski, Act. Cientif. Potos. 4: 65 & 91. 1960; T. B. Mitchell, Bees East. U. S. [N. C. Agr. Exp. Sta. Tech. Bull. 141]: 292. 1960; M. L. Buch, U. S. Dept. Agr. Agric. Handb. 64: 13. 1960; Muñoz Pizarro, Espec. Plant. Descr. Philippi 110-111. 1960; Anon., Billie Bear Plant List 8. 1961; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 143-144. 1961; Irwin, Roadside Flow. Tex. 189-190,

pl. 39. 1961; Hatusima, Mem. South. Indust. Sci. Inst. Kagoshima Univ. 3 (1): 31 & 3 (2): 143. 1962; Buchi & Manning, Tetrahedron 18: 1049--1059. 1962; D. B. Ward, Rhodora 64: 91. 1962; T. Mey., Op. Lill. 10: 50 & 65. 1963; Pinkava, Ohio Journ. Sci. 63: 125. 1963; Taylor & Hamblin, Handb. Wild Fl. Cult. 168--169, 257, 267, 279, & 294. 1963; Buchi & Manning, Biol. Abstr. 41: B.105. 1963; Harborne in T. Swain, Chem. Pl. Tax. 372. 1963; Steyerl., Fl. Mo. 1257--1261, pl. 302 & 303. 1963; Shelford, Ecol. N. Am. 77 & 607. 1963; G. N. Jones, Am. Midl. Nat. Monog. 7: [Fl. Ill., ed. 3] 212--213 & 400. 1963; Sharma & Mukhopadhyay, Journ. Genet. 58: 358--360, 372, 376--380, & 384, pl. 12, fig. 53 & 54. 1963; Moldenke, Phytologia 8: 460--496 (1963), 9: 351--407 (1963), 10: 89, 91--115, 117--125, 127--143, 145--155, 157--161, & 490--504 (1964), and 11: 1--68 & 72, fig. 13 & 14. 1964; A. & I. Nehrling, Pict. Book Perenn. 130--131 & 286. 1964; Shinners, Sida 1: 298. 1964; Moldenke, Biol. Abstr. 45: 8025, B.126, B.127, B.129, & B.131. 1964; Langman, Select. Guide Lit. Glow. Pl. Mex. 208, 329, 515--517, 580, 680, 748, & 1010. 1964; Menninger, Seaside Pl. 35, 51, 54, 98, 265, 269, & 302. 1964; Soukup, Biota 5: 42, 52, 115, & 134--135. 1964; Moldenke, Résumé Suppl. 10: 1, 2, 4, & 7 (1964) and 11: 1--8. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1235--1246, 1251, & 1738--1739. 1964; A. L. Moldenke, Phytologia 10: 166 & 238. 1964; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1963: 60. 1964; Punt, Reg. Veg. 36: 36. 1964; Henry & Buker, Trillia 12: 89, 125, & 132. 1964; Anon., Herald Statesman, Yonkers, N. Y., p. 27, Nov. 19. 1964; Hocking, Excerpt. Bot. A.7: 454--456. 1964; Anon., Biol. Abstr. 46 (2): B.130. 1965; Moldenke, Phytologia 11: 219--286, 290--357, & 400--422. 1965; Anon., Time 85 (5): 42. 1965; Anon., N. Y. Herald Trib., sect. 2, p. 19, Feb. 7, 1965.

Addenda to list of excluded species:

Verbena suffruticosa reclinata foliis angustis serrato-dentato,
pedunculis longis solitariis, floribus conglobatis P. Br. =
Phyla stoechadifolia (L.) Small

Verbena undulata Reitz = Lantana undulata Schrank

Addenda to list of abbreviations employed for the names of herbaria whose material is cited:

Cd = Museo de Córdoba, Córdoba, Argentina

Fj = Fred B. Jones Herbarium, Corpus Christi, Texas

Ij = Science Museum, Institute of Jamaica, Kingston, Jamaica

Lb = University of Missouri, Columbia, Missouri

Sj = University of Puerto Rico, San Juan, Puerto Rico

Ww = Rob and Bessie Welder Wildlife Foundation, Corpus Christi, Texas

Ruling (1774) brackets Verbena and Phryma together and says "Verbena Ringentes et Verticillatas coniungit". He seems to regard Verbena, however, as a member of his "Ordo" Ringentes, Section Pediculares. In Alvarez (1919) the generic name is in some places uppercased and in some places lowercased.

Muesebeck, Krombein, & Townes (1951) report that the genus Ver-

Verbena is regularly and apparently exclusively visited by the bees Calliopsis hirsutifrons Cockerell [C. verbenae Cockerell & Porter] and C. nebraskensis Crawford [C. verbenae var. nebraskensis Crawford].

Soukup (1964) records the common names "azulina", "huallekjapaya", "huaynu-huayta", "maycha", "sandia lagüen", and "tacpa". He says "El cocimiento se emplea para lavar úlceras de mal carácter, en tratamiento de la terciana; la cataplasma de las hojas en la supuración del hígado, los polvos bebidos en vino añejo en tratamiento de ictericia, el cocimiento con sal y limón, se toma como purgante; el cocimiento en enjuagatorios en el dolor de muelas; el cocimiento en enemas, en el tratamiento de la fiebra tifoidea, el cocimiento se toma en la colerina, como febrífugo y en enemas como desirritante." It is said that the Pawnee Amerinds brewed a tea from Verbena flowers which they called "pleasant-dream-drink" and apparently used it to quiet nerves and induce sleep. This may have been the first tranquilizer used in North America!

Spector (1956) says that this is one of fifty plants that are host in North America and Europe to the chrysanthemum nematode (Aphelenchoides ritzema-bosi), which is a vagrant endoparasite of the buds and foliage. The symptoms are crumpled distorted leaves and leaf spots. Control consists of hot water treatment of the dormant plants, as well as parathion sprays. He also reports that many species of this genus are severely injured by relatively low concentrations of 2,4-D, only slightly depending on the species involved.

VERBENA ABRAMSI Moldenke

Additional bibliography: Moldenke, Phytologia 10: 91 & 140 (1964) and 11: 105. 1964.

xVERBENA ADULTERINA Hausskn.

Additional bibliography: Moldenke, Phytologia 10: 91, 210, 212, & 219. 1964.

VERBENA ALATA Sweet

Additional bibliography: Reitz, Sellowia 13: 67 & 110. 1961; Moldenke, Phytologia 10: 91, 122, & 160 (1964) and 11: 121. 1964.

VERBENA AMBROSIFOLIA Rydb.

Additional bibliography: Moldenke, Résumé Suppl. 10: 2 (1964) and 11: 2. 1964; Moldenke, Phytologia 10: 91--92 (1964), 11: 32, 43, & 48 (1964), and 11: 273, 290, & 326. 1965.

Jackson reports this species as very abundant along roadsides in Guadalupe County, New Mexico. The Tharp & Janszen 49-1140 distributed as this species is actually V. wrightii A. Gray. D. B. Dunn 3050 is a mixture with V. bipinnatifida var. latilobata Perry.

Additional citations: KANSAS: Douglas Co.: Wilson & Miller s.n. [6-15-12] (Lw). Linn Co.: B. F. Bush 15503 (Lb--23431). OKLAHOMA: Logan Co.: Gephardt 940 (W--2421207). TEXAS: Culberson Co.: Tharp

& Janszen 49-1169 (Lw). NEW MEXICO: Guadalupe Co.: S. W. Jackson 12-1 (Lw). San Miguel Co.: D. B. Dunn 6595 (Lb--41601). Socorro Co.: D. B. Dunn 3050, in part (Lb--48431).

VERBENA ARAUCANA R. A. Phil.

Additional bibliography: Muñoz Pizarro, Espec. Plant. Descr. Philippi 110. 1960; Moldenke, Phytologia 10: 93 (1964) and 11: 58. 1964.

The Macbride photograph 17400, cited below, is of a specimen that was deposited in the herbarium of the Botanisches Museum at Berlin, now destroyed.

Additional citations: CHILE: Linares: R. A. Philippi s.n. [Linares; Macbride photos 17400] (N--photo).

VERBENA ARISTIGERA S. Moore

Additional bibliography: Moldenke, Phytologia 10: 93 (1964) and 11: 284 & 290. 1965.

VERBENA ATACAMENSIS Reiche

Additional bibliography: Moldenke, Phytologia 10: 93 (1964) and 11: 245. 1965.

xVERBENA BAILEYANA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 93 & 210. 1964.

VERBENA BAJACALIFORNICA Moldenke

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1245. 1964; Moldenke, Phytologia 11: 32. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 516. 1964.

VERBENA BALANSAE Briq.

Additional bibliography: Reitz, Sellowia 11: 57 & 134 (1959) and 13: 67 & 110. 1961; Moldenke, Phytologia 10: 93 (1964) and 11: 312 & 313. 1965.

VERBENA BARBATA Grah.

Additional bibliography: Moldenke, Phytologia 10: 93. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 329 & 1010. 1964.

VERBENA BERTERII (Meisn.) Schau.

Additional synonymy: Glandularia berteroi Muñoz Pizarro, Sin. Fl. Chil. 199 & 200, pl. 97. 1959.

Additional bibliography: Muñoz Pizarro, Sin. Fl. Chil. 199 & 200, pl. 97. 1959; Moldenke, Phytologia 10: 93--94 (1964), 11: 51, 52, 188, & 189 (1964), and 11: 245 & 246. 1965.

Additional illustrations: Muñoz Pizarro, Sin. Fl. Chil. pl. 97. 1959.

It should be noted here that the Macbride photograph 7853, cited below, is a photograph of two specimens in the Delessert Herbarium at the Conservatoire et Jardin Botaniques in Geneva.

Additional citations: CHILE: Colchagua: Bertero 744 [Macbride

photos 7853, in part] (N--photo of isotype). Valparaíso: Bertero 1389 [Macbride photos 7853, in part] (N--photo).

VERBENA BIPINNATIFIDA Nutt.

Additional synonymy: Verbena bipinnatifidia Nutt. ex Moldenke, Résumé Suppl. 10: 7, in syn. 1964.

Additional bibliography: Irwin, Roadside Flow. Tex. 189, pl. 39. 1961; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 143. 1961; Steyer., Fl. Mo. 1257, 1261--1263, map 1846, pl. 303, fig. 3. 1963; Moldenke, Résumé Suppl. 10: 1 & 7 (1964) and 11: 4. 1964; Moldenke, Phytologia 10: 94--95, 217, 282--284, 306, & 307 (1964), 11: 13, 25, 32, 41, 43, 47, & 48 (1964), and 11: 290, 308, & 326. 1965.

Additional illustrations: Irwin, Roadside Flow. Tex. pl. 39 [in color]. 1961; Steyer., Fl. Mo. pl. 303, fig. 3. 1963.

The species has been found by recent collectors in pasture openings and dry rocky prairie ravines, exposed areas of dry prairie hillsides, in calcareous or clay loam soil, sandy soil of roadsides, sandy loam over caliche, chalky soil of roadside waste places, and dry sandy soil along the edges of roadside embankments, along sandy fencerows, trails in shortgrass grasslands, and dry caliche rocky roadsides, on slopes and dry prairie slopes, road shoulders, dry rocky or open rolling prairies, exposed roadcuts in chalky soil, rolling buffalograss prairies, prairie bluffs and limestone outcrops of steep prairie bluffs, overgrazed grasslands, rocky and dry prairie hillsides, rocky ridges with Buchloe, caliche outcrops, and prairies along the edges of chalky banks. An additional common name is "prairie verbena".

The corolla is described as "blue" on Horr 4766 & 4775, "bluish-purple" on Harms 1758, and "reddish to purple" on McGregor 5678.

In Oklahoma the plant was found by McGregor on rocky prairies in Murray County. In Texas Harms found it abundant along fencerows and in red chalky loam in Kent County and "locally numerous" in grassy roadsides in Baylor County. In Kansas it was reported by Wagenknecht as "common in ditches and dry disturbed soil along roads through prairie hillsides" in Ellsworth County; Morley found it growing in thin loam soil over limestone, scattered along roadsides and common on grazed prairie pastures in Republic County; Hulbert found it scattered in upland grasslands in Morton County and sparse on eroded gravelly banks in grassland in Russell County. It is described by Ireland as common on the prairie in Wabaunsee County. McGregor found it "in scattered patches on mixed grass prairie hillslopes" in Osborne, scattered in fencerows, in red gypsum soil of rough dissected prairie, and in shortgrass association in Hodgeman, scattered on prairie hillsides in Trego, scattered on prairie slopes in Rooks, common on open banks in rough gypsum prairies, common in red gypsum soil of rolling prairies, and scattered colonies in red gypsum soil of prairies in Barber County. The same collector reports the species as common in barren places in overgrazed prairies in Morton, scattered in overgrazed places in bottom of prairie ravines in Scott, scattered in open places of

rocky prairies in Russell, common on rocky prairie hillsides in Ford, and scattered patches on rocky prairie hillsides in Jewell County. He also reports it as scattered on sandy plains in Logan, common on banks and in open places in Rooks, "scattered colonies on rocky prairie hillsides" in Pottawatomie, "in scattered colonies at edge of buffalograss prairies" in Russell, and "plants in scattered clones [sic] on rocky prairie hillsides" in Hodgeman County.

Horr says that the species is "common all over Meade County", in dry loam wasteland and "common" in dry loam grassland in Russell, "common throughout Clark County", in dry sandy loam of grassland and "scattered in dry loam of grassland" in Clark and Jewell Counties, "scattered" in dry calcareous loam of chalk cliffs in grassland in Phillips, and "scattered in dry loam of overgrazed grassland" in Rooks County. Horr & Horr report it common but not plentiful in dry loam of grassland and wasteland in Trego County, while Horr & McGregor describe it as common in dry sand of roadside ditches in Kiowa County.

The D. B. Dunn 3050 (in part) & 6595, S. W. Jackson 12-1, and Wilson & Miller s.n. [6-15-12], distributed as V. bipinnatifida, are actually V. ambrosifolia Rydb.; D. B. Dunn 3050 (in part), 3267, & 6375 are V. bipinnatifida var. latilobata Perry; Hulbert 3572 & 3581, E. L. Richards 2533, and Wagenknecht 3094 & 4345 are V. bracteata Lag. & Rodr.; Wagenknecht 2605 & 3529 are V. canadensis (L.) Britton; D. B. Dunn 3039, 3276, & 6445, Dunn & Levine 3439, and Dunn & Lint 4384 are V. ciliata Benth.; C. M. Rowell 4702 is V. ciliata var. longidentata Perry; and D. B. Dunn 3081 and Wagenknecht 4754 are V. wrightii A. Gray, while the F. B. Jones 1867, distributed as "prob. albino of V. bipinnatifida" is V. ciliata Benth.

Additional citations: KANSAS: Barber Co.: E. W. Lathrop 2241 (Lw); R. L. McGregor 10665 (Lw), 12211 (Lw), 14024 (Lw), 14237 (Lw), 14876 (Lw); E. L. Richards 3715 (Lw); B. L. Wagenknecht 2438 (Lw). Clark Co.: W. H. Horr 3305 (Lw), 4459 (Lw). Ellis Co.: R. L. McGregor 9308 (Lw); H. Shepherd 83 (Lb--33197). Ellsworth Co.: R. L. McGregor 9261 (Lw); B. L. Wagenknecht 2501 (Lw). Ford Co.: R. L. McGregor 10917 (Lw). Gove Co.: Hulbert 3535 (Lb--50383, Lw). Hodgman Co.: R. L. McGregor 4601 (Lw), 5181 (Lw), 10598 (Lw, Lw). Jewell Co.: W. H. Horr 4368 (Lw), 7775 (Lw); R. L. McGregor 7369 (Lw). Kiowa Co.: Horr & McGregor 3809 (Lw). Logan Co.: R. L. McGregor 17251 (Lw). Meade Co.: W. H. Horr 3448 (Lw). Morton Co.: Hulbert 3582 (Lb--50494, Lw); R. L. McGregor 12953 (Lw). Norton Co.: E. L. Richards 2761 (Lw). Osborne Co.: R. L. McGregor 7425 (Lw). Phillips Co.: W. H. Horr 4766 (Lw); R. L. McGregor 9533 (Lw); E. L. Richards 2744 (Lw). Pottawatomie Co.: R. L. McGregor 12288 (Lw). Republic Co.: G. E. Morley 278 (Lw). Rooks Co.: V. L. Harms 1307 (Lw); W. H. Horr 4983 (Lw); R. L. Mc

Gregor 9575 (Lw), 12452 (Lw). Russell Co.: V. L. Harms 923 (Lw); W. H. Horr 4921 (Lw); Hulbert 3470 (Lw); R. L. McGregor 5678 (Lw), 9295 (Lw), 12410 (Lw); E. L. Richards 365 (Lw). Scott Co.: Fearing & Latham s.n. [August 14, 1950] (Lw); R. L. McGregor 13007 (Lw). Smith Co.: W. H. Horr E.108 (Lw, Lw); E. L. Richards 2889 (Lw). Trego Co.: V. L. Harms 973 (Lw); Horr & Horr 4208 (Lw); R. L. McGregor 9345 (Lw), 17142 (Lw); E. L. Richards 411 (Lw). Wa-baunsee Co.: Ireland 71 (Lw). OKLAHOMA: Murray Co.: R. L. McGregor 15015 (Lw). TEXAS: Baylor Co.: V. L. Harms 1737 (Lw). Kent Co.: V. L. Harms 1758 (Lw). Nueces Co.: F. B. Jones 1718a (Ww). San Patricio Co.: F. B. Jones 2838 (Fj), 4485 (Ww), 4523 (Ww), 4904 (Ww). Travis Co.: M. Pearce s.n. [Austin, April 1932] (Lb--27597). NEW MEXICO: Catron Co.: Norris & Zweifel s.n. [9-4-48] (Lb--43843).

VERBENA BIPINNATIFIDA var. LATILOBATA Perry

Additional bibliography: Moldenke, Résumé Suppl. 11: 4. 1964; Moldenke, Phytologia 10: 92, 95, & 98 (1964) and 11: 326. 1965.

Additional citations: NEW MEXICO: Otero Co.: D. B. Dunn 3267 (Lb--48458). Socorro Co.: D. B. Dunn 3050, in part (Lb--48400). Torrance Co.: D. B. Dunn 6375 (Lb--41689).

xVERBENA BLANCHARDI Moldenke

Additional bibliography: G. N. Jones, Am. Midl. Nat. Monog. 7: [Fl. Ill., ed. 3] 213. 1963; Moldenke, Phytologia 10: 95, 155, 164, & 180. 1964; Moldenke, Résumé Suppl. 10: 1. 1964.

The E. W. Lathrop 369 collection is a mixture with V. canadensis (L.) Britton. W. H. Horr 4436, 4648, & 4697, distributed as xV. blanchardi, are actually V. hastata L.

The hybrid has been found in overgrazed prairie pastures and in prairie pastures with limestone rock surfacing, flowering in May.

Additional citations: KANSAS: Woodson Co.: E. W. Lathrop 369, in part (Lw), 488 (Lw).

VERBENA BONARIENSIS L.

Additional synonymy: Verbena bonaeiriensis L. ex Alvarez, Fl. Santiago del Estero 106, sphalm. 1919. Verbena banariensis L. ex Moldenke, Résumé Suppl. 10: 7, in syn. 1964.

Additional literature: Ann. Mus. Hist. Nat. Paris 15: pl. 14, fig. 4. 1810; R. A. Phil., Anal. Univ. Chil. 35: 192. 1870; Alvarez, Fl. Santiago del Estero 106. 1919; Augusto, Fl. Rio Grande do Sul 235. 1946; Reitz, Sellowia 11: 57 & 134. 1959; Moldenke, Résumé Suppl. 10: 7 (1964) and 11: 4. 1964; A. & I. Nehrling, Pict. Book Perenn. 131. 1964; Moldenke, Phytologia 10: 95, 125, 160, 291, & 498 (1964) and 11: 41, 62, 63, 84--86, 88, 98, 99, & 183 (1964), and 11: 336 & 341. 1965.

An additional common name recorded for this species is "sangre

de Cristo", but this name is also applied to V. litoralis H.B.K. and to V. peruviana (L.) Britton.

The Bracelin 1512 & 2827, distributed as V. bonariensis, are actually var. conglomerata Briq., while Beamer s.n. [April 30, 1953], Demaree 15103, Glaziou 6048, and S. M. Tracy 8706 are V. brasiliensis Vell.

Additional citations: ARKANSAS: Drew Co.: Demaree 23251 (Lb--46746). PUERTO RICO: Alain 10365 (G, Ij, N, Sj, Z, Z). BRAZIL: Guanabara: Boechat 22 (Ja); Palacios, Balegno, & Cuezco 4017a (Ja--54403), 4020 (Ja--54405). Minas Gerais: Duarte & Graziola 7864 (N). Rio de Janeiro: Lanna Soti 12 (Ja, Z).

VERBENA BONARIENSIS var. CONGLOMERATA Briq.

Additional bibliography: Moldenke, *Phytologia* 10: 95. 1964.

This plant has been collected in fruit in December.

Additional citations: CULTIVATED: California: Bracelin 1512 (N), 2827 (N).

VERBENA BRACTEATA Lag. & Rodr.

Additional bibliography: Spector, *Handb. Biolog. Data* 394. 1956; G. N. Jones, *Am. Midl. Nat. Monog.* 7: [Fl. Ill., ed. 3] 213. 1963; Steyerl., *Fl. Mo.* 1257--1261, map 1844, pl. 302, fig. 3. 1963; Moldenke in Shreve & Wiggins, *Veg. & Fl. Son. Des.* 2: 1242. 1964; Moldenke, *Résumé Suppl.* 10: 1 (1964) and 11: 1--4. 1964; A. L. Moldenke, *Phytologia* 10: 166. 1964; Punt, *Reg. Veg.* 36: 36. 1964; Moldenke, *Phytologia* 10: 96, 140, 141, 152, 154, 155, 186, 210, & 307--311 (1964) and 11: 13, 28--30, 32--34, 43, 86, 103--105, 113, 116, 117, 163, 165, 198, 200, 202, & 203 (1964), and 11: 241. 1965.

Additional illustrations: Steyerl., *Fl. Mo.* pl. 302, fig. 3. 1963.

Spector (1956) reports that this species can be killed by relatively low concentrations of at least one formation of 2,4-D.

Recent collectors have found the plant growing in sandy and dry sandy areas, limestone ground, pastures and open barren areas in pastures, overgrazed areas, waste places along railroad tracks, sandy soil of waste areas or waste places, sandy clay loam soil, loam or rich loam with fair soil moisture, dry rocky clay soil in schoolyards, talus at base of chalk cliffs, roadside waste land, overgrazed prairies, thickets along roadsides, bare open places, breaks along rivers, and rocky soil on creek bottoms with Euphorbia, on roadside banks and clay ravine banks, prairies, the bottoms of dried ponds, banks of stationery sand dunes, railroad ballast and embankments, and sandy flood flats, as well as the edge of thickets near creeks, the edge of fields and cultivated fields, the edge of prairies, and the edge of roadsides in dry sandy arid rangeland, and along cattle trails in shortgrass association.

Poindexter 18 bears a notation to the effect that its chromosome count was $n = 7$. Unger found V. bracteata "rare and scatter-

ed in grazed sandy areas" in Stafford County; Lathrop encountered it in overgrazed prairie pastures with limestone rock surfacing in Woodson County; while Wagenknecht found it in dry clay soil in badly eroded areas at the base of river bluffs in Doniphan, scattered throughout rolling sandy prairie pastures in Stafford, and common at the edges of sand dunes in rangeland in Reno County, Kansas. It is described by Hulbert as "scattered in upland grasslands" in Morton, "scarce on sandy hills" in Grant, "frequent in loam soil of weedy pastures" in Wichita, "local patches in sloping upland in native grassland" in Rawlins, and "sparse on eroded gravelly banks in grasslands" in Russell County. Horr informs us that it is "scattered in wet loam of floodland" in Meade, "common in dry loam of grasslands" in Ford, "common in dry clay of grasslands" in Marion, "common in dry loam of overgrazed grasslands" in Marshall, "scattered in dry loam of roadsides" in Smith, "common in dry loam and clay of roadsides, waste land, and pastures" in Coffey, and "common in dry sand of waste land" in Meade County. It is described by McGregor as "scattered along roadsides" in Kiowa, "abundant in open places" in Logan, "common at edge of fields" in Montgomery, "common in local areas on sandy floodplains" in Cheyenne, "abundant in disturbed roadside areas" in Decatur, and "common in red gypsum soil of prairies and scattered on roadside banks" in Barber County. He also states in regard to his no. 7331 "plants prostrate or only with a few of the branches slightly erect. Was growing with an erect form of the species represented by my number 7330" — and for his no. 7330 he says "Several of these plants were found which grew erect and not at all the habit of the species. Typical plants were also present."

The corolla is described as "blue" on Horr 4569 & 4772. An additional common name is "low vervain". The Norris & Zweifel s.n. [9-4-48], distributed as V. bracteata, is actually V. bipinnatifida Nutt., while Dalke s.n. [9.10.39] is V. canadensis (L.) Britton.

Steyermark (1963) records this species from Andrew, Barry, Carroll, Cass, Clark, Clinton, Cole, Crawford, DeKalb, Douglas, Gentry, Harrison, Holt, Howard, Johnson, Laclede, Lafayette, Lawrence, Linn, Livingston, Macon, Madison, Moniteau, New Madrid, Newton, Osage, Ozark, Pettis, Pulaski, Ray, Reynolds, Saint Clair, Saint Francois, Saline, Scott, Stone, Sullivan, Vernon, Washington, and Worth Counties, Missouri, on the basis of specimens in the herbarium of the Missouri Botanical Garden at St. Louis, not as yet seen by me. The Crookshanks 142 which he says "appears to be a hybrid between V. bracteata and V. hastata" is actually xV. perriana Moldenke.

Additional citations: NEW YORK: Rockland Co.: Lehr 1018 (N). INDIANA: Madison Co.: A. R. Moldenke 801 (Lw). IOWA: Cass Co.: H. N. Moldenke 21938 (Lw). Clayton Co.: A. R. Moldenke 992 (Lw). Delaware Co.: A. R. Moldenke 985 (Lw). Iowa Co.: A. R. Moldenke 973 (Lw). Keokuk Co.: A. R. Moldenke 969 (Lw), 970 (Lw). Linn Co.: A. R. Moldenke 978 (Lw). Madison Co.: A. R. Moldenke 944 (Lw). Mahas-

ka Co.: A. R. Moldenke 958 (Lw). Marion Co.: A. R. Moldenke 952 (Lw). Mills Co.: A. R. Moldenke 919 (Lw). Pottawatomie Co.: A. R. Moldenke 921 (Lw), 933 (Lw). Poweshiek Co.: A. R. Moldenke 968 (Lw). Warren Co.: A. R. Moldenke 948 (Lw). Washington Co.: B. L. Wagenknecht 330 (Lw). MICHIGAN: Menominee Co.: A. R. Moldenke 1025 (Lw). Wexford Co.: A. R. Moldenke 1028 (Lw). WISCONSIN: Adams Co.: Rickett s.n. [Friendship, June 24, 1926] (Lb--27608). Dane Co.: A. R. Moldenke 1007 (Lw). Iowa Co.: A. R. Moldenke 1006 (Lw). MINNESOTA: Polk Co.: Terrell 1833 (W--2388720). KANSAS: Allen Co.: A. R. Moldenke 874 (Lw). Anderson Co.: A. R. Moldenke 872 (Lw). Barber Co.: W. H. Horr 3118 (Lw); R. L. McGregor 12865 (Lw), 14766 (Lw), 14913 (Lw). Barton Co.: A. R. Moldenke 896 (Lw). Brown Co.: A. R. Moldenke 911 (Lw). Chautauqua Co.: A. R. Moldenke 884 (Lw). Cheyenne Co.: W. H. Horr 4725 (Lw), 4740 (Lw); R. L. McGregor 13566 (Lw). Cloud Co.: R. L. McGregor 4833 (Lw). Coffey Co.: W. H. Horr 3481 (Lw). Comanche Co.: R. L. McGregor 14669 (Lw). Cowley Co.: A. R. Moldenke 886 (Lw). Decatur Co.: R. L. McGregor 13517 (Lw); E. L. Richards 2844 (Lw). Dickinson Co.: A. R. Moldenke 902 (Lw). Doniphan Co.: W. H. Horr 4301 (Lw); B. L. Wagenknecht 3290 (Lw). Douglas Co.: W. C. Stevens 6719 (Lw). Elk Co.: A. R. Moldenke 876 (Lw). Ellsworth Co.: A. R. Moldenke 898 (Lw); B. L. Wagenknecht 2506 (Lw). Finney Co.: Wilson & Miller s.n. [7-18-12] (Lw). Ford Co.: W. H. Horr 3613 (Lw). Franklin Co.: Hetzer 318 (Lw). Geary Co.: F. C. Gates 19783 (Lb--47720); A. R. Moldenke 903 (Lw). Grant Co.: Hulbert 3572 (Lw). Harper Co.: R. L. McGregor 14697 (Lw). Hodgeman Co.: R. L. McGregor 10616 (Lw). Jefferson Co.: J. Latham 368 (Lw); A. R. Moldenke 904 (Lw). Jewell Co.: W. H. Horr 4394 (Lw). Kingman Co.: R. L. McGregor 7322 (Lw); A. R. Moldenke 893 (Lw). Kiowa Co.: Horr & McGregor 3790 (Lw); R. L. McGregor 15168 (Lw). Leavenworth Co.: E. L. Richards 2670 (Lw). Linn Co.: A. R. Moldenke 870 (Lw). Logan Co.: R. L. McGregor 9409 (Lw). Marion Co.: W. H. Horr 3472 (Lw). Marshall Co.: W. H. Horr 4569 (Lw). Meade Co.: W. H. Horr 3301 (Lw), 3345 (Lw), 3458 (Lw). Montgomery Co.: R. L. McGregor 14594 (Lw). Morris Co.: E. L. Richards 1786 (Lw). Morton Co.: Hulbert 3581 (Lw); E. L. Richards 2455 (Lw), 2533 (Lw). Nemaha Co.: R. L. McGregor 12270 (Lw). Norton Co.: R. L. McGregor 9497 (Lw). Pawnee Co.: B. L. Wagenknecht 4504 (Lw). Pratt Co.: H. N. Moldenke 21928 (Lw). Rawlins Co.: Hulbert 3488 (Lb--50461, Lw); R. L. McGregor 9469 (Lw). Reno Co.: R. L. McGregor 7330 (Lw), 7331 (Lw); B. L. Wagenknecht 3094 (Lw). Republic Co.: G. E. Morley 114 (Lw), 524 (Lw). Rice Co.: E. W. Lathrop 3854 (Lw). Riley Co.: F. C. Gates 12748 (Lb--27596). Russell Co.: Hulbert 3471

(Lw). Saline Co.: A. R. Moldenke 900 (Lw). Sedgwick Co.: W. H. Horr 6719 (Lw). Seward Co.: W. H. Horr 3096 (Lw). Shawnee Co.: Volle 790a (Lw). Smith Co.: W. H. Horr 4772 (Lw). Stafford Co.: Ungar 819 (Lw); B. L. Wagenknecht 4345 (Lw). Stanton Co.: R. L. McGregor 4529 (Lw), 16134 (Lw). Sumner Co.: A. R. Moldenke 888 (Lw). Trego Co.: Horr & Horr 4175 (Lw); J. D. Poindexter 18 (Lw). Wallace Co.: V. L. Harms 1189 (Lw). Wichita Co.: Hulbert 3262 (Lb--50502, Lw). Wilson Co.: R. L. McGregor 15053 (Lw); A. R. Moldenke 875 (Lw). Woodson Co.: E. W. Lathrop 1276 (Lw). Wyandotte Co.: E. L. Richards 3210 (Lw). MISSOURI: Barton Co.: E. J. Palmer 50944 (Lb--50944), 55331 (Lb--50948); Z. Williams s.n. [Lamar, Aug. 1928] (Lb--4166). Bates Co.: A. R. Moldenke 866 (Lw), 892 (Lw). Boone Co.: Daniels s.n. [Columbia, Jul. '97] (Lb--4165); Drouet 791 (Lb--12069), s.n. [Columbia, 8/31/30] (Lb--8502, Lb--8503); Favor s.n. [July 16, 1901] (Lb--4160, Lb--4161); Rickett s.n. [June 29, 1929] (Lb--7104); Van Horn s.n. [Columbia, 7/18/25] (Lb--10944). Dunklin Co.: Steyermark 7934 (Lb--45325). Franklin Co.: J. M. Mason s.n. [Meramec State Park, 7/17/35] (Lb--34370); A. R. Moldenke 845 (Lw). Grundy Co.: Crookshanks 240 (Lb--29745). Henry Co.: A. R. Moldenke 864 (Lw); E. J. Palmer 55829 (Lb--50945). Jackson Co.: B. F. Bush s.n. [6-2-1892] (Lb--4162). Mississippi Co.: R. R. Kincaid s.n. [Sept. 4, 1927] (Lb--4163, Lb--4164). Nodaway Co.: J. R. Singleton 169 (Lb--34593). ARKANSAS: Bradley Co.: Demaree 25503 (Lb--53498). Marion Co.: Demaree 47929 (Lw). Saint Francis Co.: Demaree 47840 (Lw). NEVADA: Clark Co.: Clokey 8096 (Lb--35773, N). COLORADO: Boulder Co.: Daniels 2 (Lb--27601). El Paso Co.: Naylor s.n. [Aug. 19, 1933] (Lb--27600). Huerfano Co.: B. L. Wagenknecht 2903 (Lw). Jefferson Co.: Perdue 4034 (W--2422918). NEBRASKA: Cass Co.: A. R. Moldenke 917 (Lw). Otoe Co.: A. R. Moldenke 961 (Lw). OKLAHOMA: Pawnee Co.: C. F. Coffman s.n. [Pawnee, Aug. 31, 1933] (Lb--14291). NEW MEXICO: Santa Fé Co.: Dunn & Lowe 6485 (Lb--40728). Socorro Co.: D. B. Dunn 4711 (Lb--54401). Torrance Co.: D. B. Dunn 6125 (Lb--38497), 6149 (Lb--38329), 6204 (Lb--38545). CALIFORNIA: San Bernardino Co.: Parish & Parish 2171 (Lb--27692).

VERBENA BRASILIENSIS Vell.

Additional bibliography: Reitz, *Sellowia* 11: 57 & 134 (1959) and 13: 67 & 110. 1961; Jones, Rowell, & Johnston, *Flow. Pl. & Ferns Tex. Coast. Bend* 143. 1961; Moldenke, *Phytologia* 10: 96--97, 160, 217, 296, & 297. 1964; Moldenke, *Résumé Suppl.* 10: 1 (1964) and 11: 3 & 86. 1964.

The corolla is described as deep-lavender on Perdue 4153 and as purple on Beamer s.n. [April 30, 1953]. Recent collectors have found the plant in clay of roadside ditches, in clearings

near roadsides, and in clay banks and ditches. F. B. Jones describes it as locally abundant in clay soil along ditches near railroads in San Patricio County, Texas. Demaree calls it "common in flat wet woods" in Arkansas. Material has been misidentified and distributed in herbaria as V. xutha Lehm.

Additional citations: FLORIDA: Escambia Co.: S. M. Tracy 8706 (Lb--27599). ALABAMA: Dallas Co.: Perdue 4152 (W--2422193). ARKANSAS: Ouachita Co.: Demaree 48182 (Lw). Saint Francis Co.: Demaree 15103 (Lb--47033). LOUISIANA: Vernon Par.: R. L. McGregor 15570 (Lw). TEXAS: Harris Co.: Beamer s.n. [April 30, 1953] (Lw). Nueces Co.: F. B. Jones 6192 (Ww). San Patricio Co.: F. B. Jones 1924 (Ww). BRAZIL: Rio de Janeiro: Glaziou 6048 (Ja--11150).

VERBENA CALLIANTHA Briq.

Additional bibliography: Moldenke, *Phytologia* 10: 97 (1964), 11: 189 (1964), and 11: 290 & 315. 1965.

VERBENA CAMERONENSIS L. I. Davis

Additional bibliography: Moldenke, *Résumé Suppl.* 10: 2. 1964; Moldenke, *Phytologia* 10: 97 (1964) and 11: 307. 1965.

The flowers are described as "rose-blue" on McGregor 16442. The species has been found on the floodplains of small rivers, fruiting in February.

Additional citations: MEXICO: Puebla: R. L. McGregor 16442 (Lw).

VERBENA CAMPESTRIS Moldenke

Additional bibliography: Reitz, *Sellowia* 11: 57 & 134. 1959; Moldenke, *Phytologia* 10: 97. 1964.

VERBENA CANADENSIS (L.) Britton

Additional & emended synonymy: Anonymos caroliniensis Walt., *Fl. Carol.* 164. 1788 [not Anonymos caroliniensis Walt., op. cit. 263, nor A. caroliniensis Walt., op. cit. 188. 1788]. Verbena aubrietiae Schnarf, *Ost. Bot. Zeitschr.* 74: 41, sphalm. 1925; Schnarf in Linsb., *Handb. Pflanzenanat.* 10 (2): 233 & 688, sphalm. 1929. Lobelia aubrietiae Jönsson ex Schwencke, *Zytol. Untersuch. Verbenac.* 6, in syn. 1931. Canadæa aubletia Patermann, *Beitr. Zytol. Verbenac.* 13, 43, & [54], pl. 1, fig. 1 & 2. 1935. Verbena canadensis f. canadensis [Steyerm.], *Fl. Mo.* 1260 & 1261. 1963.

Additional bibliography: Jönsson, *Bot. Notiser* 6: 169--187. 1881; Schnarf, *Ost. Bot. Zeitschr.* 74: 41. 1925; Linsb., *Handb. Pflanzenanat.* 10 (2): 233 & 688. 1929; Schwencke, *Zytol. Untersuch. Verbenac.* 6, 12, & 24--25. 1931; Patermann, *Beitr. Zytol. Verbenac.* 13--15, 43, 49, & [54], pl. 1, fig. 1 & 2. 1935; D. B. Ward, *Rhodora* 64: 91. 1962; Steyerm., *Fl. Mo.* 1257 & 1260--1263, map 1845, pl. 303, fig. 1. 1963; Sharma & Mukhopadhyay, *Journ. Genet.* 58: 359, 372, 384, & pl. 12, fig. 54. 1963; Taylor & Hamblin, *Handb. Wild Fl. Cult.* 168--169 & 267. 1963; Moldenke, *Résumé*

Suppl. 10: 1 & 7 (1964) and 11: 1--3 & 5--8. 1964; Moldenke, *Phytologia* 10: 97--98, 113, 114, 122, 124, 125, 154, 282, 283, 311, & 499 (1964), 11: 28--30, 32, 33, 41, 43, 47, 85, & 86 (1964), and 11: 200, 263, 264, 268, 271, 279, 290, 302, 315, & 326. 1965.

Additional illustrations: Patermann, *Beitr. Zytol. Verbenac.* pl. 1, fig. 1 & 2. 1935; Steyerl., *Fl. Mo.* pl. 303, fig. 1. 1963; Sharma & Mukhopadhyay, *Journ. Genet.* 58: 384, pl. 12, fig. 54. 1963.

Ward (1962) agrees that the Anonymos caroliniensis of Walter, *Fl. Carol.*, page 164 (1788) is probably Verbena canadensis, but he is of the opinion that the similar binomial on page 263 possibly refers to Hydnum erinaceus Bull., while the A. caroliniensis on page 188 is Amphicarpa bracteata (L.) Fern.

The corolla of Verbena canadensis is described as "reddish-violet" on Harms 1379. The haploid chromosome number is given as 6 by Schwencke (1931) and by Patermann (1935).

Recent collectors have found the species in sandy grasslands, fencerows and roadside fencerows, bluestem prairie hay meadows, roadside ditches, thickets in limestone glades, prairie hayfields and dry roadside prairie hayfields, basic soil of cedar glades, loose soil of old limestone quarries, clay or dry rocky soil, or dry clay soil in cutover woodlands, on roadside and rocky prairie banks, roadside banks bordering wasteland fields, open sandy or eroded banks, open rocky banks of bluestem prairie, somewhat overgrazed and weedy rocky prairie hillsides, rocky wooded or shady oak-wooded hillsides, and prairies around the edge of lakes, and at the edges of roadside ditches, bluestem prairies, prairie pastures, and woods. In Kansas it is described by Volle as "common in grasslands in dry sandy clay soil", by Horr as "common on roadsides and wasteland in dry loam and clay", by Wagenknecht as occurring in "dry sandy soil along edges of disturbed areas on hilltops", and by Hulbert as "scarce in rocky area on southwest-facing slope in annually mowed native prairie". Marsh found it "scattered on sandy slope near springs" and "along roadside cut in hillside of rolling prairie area, glacially deposited soil with sand, clay, limestone rocks, and small granitoid boulders"; Lathrop found it in "open oak woods, sandy soil in clearing, sandstone surfacing", "roadside bank of bottomland farming area, limestone surfacing", "overgrazed prairie pasture with Maclura pomifera along crest of gully", and "common on oak-wooded hillside, sandstone outcrops".

McGregor calls the species "common on banks in rocky limestone prairie", "common in open places on rocky wooded hillsides", "common on dry rocky prairie banks", "forming large colony on roadside bank at edge of cultivated fields", "isolated colonies scattered on rocky prairie hillside, most common on eroded areas", "large colonies on prairie banks", "on rocky banks, limestone surfacing, in native bluestem prairie meadow", "common on slopes, rocky overgrazed pastures", "common near limestone escarpment on rocky prairie hillsides", "common in area of limestone outcrops",

"common on prairie banks", "scattered on bank of little ravine in prairie", "scattered colonies in rocky wooded hillsides", and "common on rocky prairie hillsides, limestone surfacing".

Taylor & Hamblin (1963) call the species "rose verbena" and say that it is a plant "for sandy soil in full sun" and "The plant is easily grown in wild gardens, but in good soil it usually dies in a few years. It may be carried on indefinitely, however, by starting new plants from the self-rooting stems. This species grows in sandy, rocky, neutral to moderately acid soils from Florida to Texas, north to Virginia, Illinois, and Colorado."

Material of this plant has also been misidentified and distributed in herbaria as xVerbena blanchardi Moldenke. On the other hand, the R. L. McGregor 7212 & 7214, distributed as V. canadensis, are var. candidissima (Haage & Schmidt) Palmer & Steyermark; B. F. Bush 15503 is V. ambrosifolia Rydb.; W. H. Horr 4983, Hulbert 3582, Ireland 71, R. L. McGregor 9295 & 9575, and B. L. Wagenknecht 2438 are V. bipinnatifida Nutt.; Rickett s.n. [Friendship, June 24, 1926] is V. bracteata Lag. & Rodr.; R. Runyon 2497 is V. ciliata var. longidentata Perry; W. H. Horr 3086 is xV. deamii Moldenke; R. Runyon 2625 is V. delticola Small; B. L. Wagenknecht 3615 is V. tenuisecta Briq.; and B. L. Wagenknecht 3620 is V. tenuisecta var. alba Moldenke. As noted above, the R. Runyon 2497 & 2625, cited in *Phytologia* 8: 453 (1962) and 465 (1963) as V. canadensis, are actually V. ciliata var. longidentata and V. delticola, respectively.

Steyermark (1963) records V. canadensis also from Benton, Bollinger, Butler, Caldwell, Camden, Cass, Cedar, Christian, Cole, Dade, Dallas, Dent, Douglas, Gasconade, Grundy, Hickory, Howard, Howell, Laclede, McDonald, Moniteau, Montgomery, New Madrid, Oregon, Osage, Perry, Pettis, Platte, Polk, Pulaski, Ralls, Ray, Reynolds, Ripley, Texas, Warren, Wayne, Webster, & Wright Counties, Missouri, based on specimens in the herbarium of the Missouri Botanical Garden at Saint Louis, not as yet seen by me.

Additional citations: IOWA: Mahaska Co.: H. N. Moldenke 21941 (Lw). TENNESSEE: Rutherford Co.: Demaree 47565 (Lw). KANSAS: Allen Co.: R. L. McGregor 10012 (Lw), 12748 (Lw). Anderson Co.: R. L. McGregor 4271 (Lw); E. L. Richards 328 (Lw); B. L. Wagenknecht 3651 (Lw). Bourbon Co.: E. W. Lathrop 3789 (Lw); R. L. McGregor 9924 (Lw). Brown Co.: R. L. McGregor 17020 (Lw). Chautauqua Co.: W. H. Horr s.n. [July 5, 1930] (Lw); E. W. Lathrop 2141 (Lw); R. L. McGregor 4210 (Lw). Cherokee Co.: E. W. Lathrop 2692 (Lw); R. L. McGregor 15264 (Lw), 15332 (Lw). Clay Co.: R. L. McGregor 5530 (Lw). Coffey Co.: W. H. Horr 3496 (Lw). Cowley Co.: D. L. Marsh 426 (Lw). Crawford Co.: R. L. McGregor 11176 (Lw). Douglas Co.: C. A. Benson s.n. [Baldwin, May 29, 1932] (Lb-27607); D. L. Marsh 1522 (Lw); R. L. McGregor 4228 (Lw), 14289 (Lw); Ungar 1a (Lw). Elk Co.: Fearing & Latham s.n. [August 10,

1950] (Lw); R. L. McGregor 4460 (Lw), 9059 (Lw), 11197 (Lw). Franklin Co.: Hetzer 91 (Lw); Hulbert 3397 (Lw); R. L. McGregor 10048 (Lw). Greenwood Co.: R. L. McGregor 10322 (Lw, Lw), 11208 (Lw). Jefferson Co.: G. Latham 79 (Lw). Johnson Co.: B. L. Wagenknecht 2584 (Lw), 2605 (Lw), 3699 (Lw). Labette Co.: R. L. McGregor 17442 (Lw). Linn Co.: H. N. Moldenke 21925 (Lw). Miami Co.: R. L. McGregor 4242 (Lw). Montgomery Co.: W. H. Horr s.n. [July 5, 1930] (Lw); R. L. McGregor 4331 (Lw), 10189 (Lw). Neosho Co.: W. W. Holland 153 (Lw); E. L. Richards 3160 (Lw). Pottawatomie Co.: R. L. McGregor 5473 (Lw). Shawnee Co.: V. L. Harms 1379 (Lw); Volle 653 (Lw). Wabaunsee Co.: V. L. Harms 1431 (Lw); Maus 36 (Lb--15169); R. L. McGregor 5548 (Lw). Wilson Co.: R. L. McGregor 4300 (Lw); Vaughn s.n. [May 1, 1937] (Lw). Woodson Co.: R. L. McGregor 4174 (Lw); E. W. Latnrop 34 (Lw), 169 (Lw), 369, in part (Lw). MISSOURI: Barton Co.: Z. Williams s.n. [Lamar, August 1928] (Lb--4158). Boone Co.: Bell s.n. [Columbia, 4/16/1801] (Lb--4144); H. E. Bradley s.n. [Columbia, Apr. 29, '02] (Lb--4142); Daniels s.n. [Columbia, Apr. 1897] (Lb--4143), s.n. [Columbia, May 11, 1902] (Lb--4147, Lb--4148, Lb--4154), s.n. [Columbia, May 1903] (Lb--4151, Lb--4152, Lb--4155), s.n. [Columbia, June 1903] (Lb--4146); Drouet 2763 (Lb--25810); D. B. Dunn 12437 (Lb--37875); Favor s.n. [Aug. 29, 1901] (Lb--4139, Lb--4149), s.n. [Columbia, May 2, 1903] (Lb--4153); S. Gray s.n. [Columbia, May 17, 1898] (Lb--4157); G. E. Moore 4 (Lb--11438); Oungst s.n. [April 15th, 1933] (Lb--11464); Rickett s.n. [April 1926] (Lb--7099, Lb--7100), s.n. [Rocheport, July 4, 1927] (Lb--7101), s.n. [Bear Spring, April 20, 1929] (Lb--7102), s.n. [Grindstone Park, June 1, 1929] (Lb--7103); J. R. Singleton s.n. [April 18, 1936] (Lb--34618); O. L. Steele s.n. [Columbia, Apr. 17, 1902] (Lb--4145, Lb--4150); J. Sylvester 3 (Lb--15148); Van Horn s.n. [Columbia, 7/27/25] (Lb--10953). Cooper Co.: B. F. Bush 11425 (Lb--15596). Crawford Co.: H. N. Moldenke 21916 (Lw). Franklin Co.: J. M. Mason s.n. [Meramec State Park, 4/19/37] (Lb--34369). Greene Co.: M. Carter s.n. [Galloway, April 10, 1929] (Lb--14484). Harrison Co.: R. J. Lemaire 1188 (Lb--49412). Iron Co.: Broadhead s.n. (Lb--4159). Jackson Co.: B. F. Bush s.n. [5-19-1891] (Lb--4156). Jasper Co.: Miles s.n. [5/1/1898] (Lb--47639). Lawrence Co.: E. J. Palmer 53390 (Lb--50946). Madison Co.: Swallow s.n. [July 1858] (Lb--2072). Maries Co.: A. R. Moldenke 852 (Lw). Marion Co.: Broadhead s.n. [May 1856] (Lb--9609). Miller Co.: Damon s.n. [April 12, 1938] (Lb--34761). Morgan Co.: B. F. Bush 11445 (Lb--15681). Newton Co.: E. J. Palmer 53471 (Lb--50947). Phelps Co.: A. Muller s.n. [Meramec, March 30, 1935] (Lb--24970). Scott Co.: R. R.

Kincaid s.n. [Commerce, Aug. 24, 1927] (Lb--4140, Lb--4141). Taney Co.: D. Spencer 123 (Lb--35300), s.n. [9.16.40] (Lb--48917), s.n. [4.12.41] (Lb--35530, Lb--48916). County undetermined: R. Baker s.n. [Lovers Leap, May 18, 1924] (Lb--9000); Dalke s.n. [Indian Trail State Forest, 9.10.39] (Lb--48915); Ryckman s.n. [Tir-isport, May 1st] (Lb--33264). ARKANSAS: Franklin Co.: Demaree 20890 (Lb--53396). IZARD Co.: A. Robinson 1790 (Lw). Lawrence Co.: Demaree 25957 (Lb--47027). Marion Co.: Demaree 47941 (Lw); D. B. Dunn 12837 (Lb--39826). Saline Co.: Demaree 34771 (Lb--53413). Stone Co.: D. L. Marsh 637 (Lw). LOUISIANA: Cameron Par.: S. M. Tracy 8707 (Lb--27606). OKLAHOMA: Latimer Co.: V. L. Harms 173 (Lw). Pittsburg Co.: McClary s.n. [Marsh 30, 1935] (Lb--32371). TEXAS: Galveston Co.: Joor s.n. [Galveston] (Lb--27609). Harris Co.: Joor s.n. [March 3, '77] (Lb--27598), s.n. [March 9, '77] (Lb--27608). Marion Co.: B. L. Wagenknecht 3529 (Lw). CULTIVATED: Missouri: Kucera s.n. [Mar. 1957] (Lb--37518). Wisconsin: H. N. Moldenke 21942 (Lw).

VERBENA CANADENSIS f. *CANDIDISSIMA* (Haage & Schmidt) Palmer & Steyerl.

Additional bibliography: Steyerl., Fl. Mo. 1260 & 1261, map 1845. 1963; Moldenke, Résumé Suppl. 10: 1. 1964; Moldenke, Phytologia 10: 98. 1964.

This form has been found by McGregor on rocky prairie banks at the edge of woods and rocky prairie roadside banks, flowering and fruiting in May. He describes the flowers on his no. 7214 as "white, fading to pink in drying".

Additional citations: KANSAS: Bourbon Co.: R. L. McGregor 7212 (Lw). Crawford Co.: R. L. McGregor 7214 (Lw).

VERBENA CANESCENS H.B.K.

Additional bibliography: Irwin, Roadside Flow. Tex. 190. 1961; Moldenke, Résumé Suppl. 11: 3. 1964; Moldenke, Phytologia 10: 98--100, 140, 141, 176--179, 182, 184--186, 303, 304, 306, & 502 (1964), 11: 12--14, 18, 32, & 43 (1964), and 11: 256. 1965.

In Texas this species has been found by Jones in brushy pastures, in sandy loam soil over caliche and in caliche outcrops, locally abundant, and in sandy loam on caliche hillsides, flowering and fruiting in March and April. In Mexico it has been found by McGregor and other recent collectors "prostrate on rocky open wooded hillside", "scattered on dry rocky shrubby range", "in open pine forest, gypsum soil", and "scattered along ditches", at altitudes of 5370 to 7000 feet, flowering and fruiting in July. The flowers are described as "blue" on McGregor 16512, 16644, & 16725 and McGregor, Harms, Robinson, R. del Rosario, & Segal 98. Jones 1822 is said to have had "light violet-blue" flowers.

The species is recorded from Amazonas, Colombia (San Cristobal), by Troncoso, but it seems most unlikely that this is correct.

Additional citations: TEXAS: Jim Wells Co.: F. B. Jones 1822 (Ww), 2935 (Ww). MEXICO: Nuevo Leon: R. L. McGregor 16725 (Lw); McGregor, Harms, Robinson, R. del Rosario, & Segal 98 (Lw). Oaxaca: R. L. McGregor 16512 (Lw). San Luis Potosí: R. L. McGregor 16644 (Lw)

VERBENA CANESCENS f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 99 & 100. 1964.

VERBENA CANESCENS var. ROEMERIANA (Scheele) Perry

Additional bibliography: G. Rzedowski, *Act. Cientif. Potos.* 4: 65 & 91. 1960; Jones, Rowell, & Johnston, *Flow. Pl. & Ferns Tex. Coast. Bend* 143. 1961; Moldenke, *Résumé Suppl.* 10: 2. 1964; Moldenke, *Phytologia* 10: 99--100 & 182 (1964) and 11: 13--15 & 18. 1964.

Lathrop found this variety growing in sandy soil of rocky gullies, with granite outcrops on the slopes with juniper, Yucca, and Opuntia, while Jones found it in sandy loam on road shoulders, flowering and fruiting in April. Lathrop 2075 is a mixture with V. plicata Greene. The F. B. Jones 1822 & 2935, distributed as V. canescens var. roemeriana, seem to be typical V. canescens H.B.K.

Additional citations: TEXAS: Bee Co.: F. B. Jones 1732a (Ww). Burnet Co.: E. W. Lathrop 2075, in part (Lw).

VERBENA CANIUENSIS Moldenke

Additional bibliography: Moldenke, *Biol. Abstr.* 27: 984. 1953; Moldenke, *Phytologia* 8: 482--483. 1963.

VERBENA CAROLINA L.

Additional bibliography: Schlecht., *Ann. Sci. Nat.*, ser. 3, 14: 342--344. 1850; Moldenke, *Phytologia* 10: 100--101, 104, 129, 130, 140, 141, 280, & 314 (1964) and 11: 13, 54--56, 86, 105, 123, 126--128, & 164. 1964; Moldenke in Shreve & Wiggins, *Veg. & Fl. Son. Des.* 2: 1239. 1964; Hocking, *Excerpt. Bot. A.* 7: 455. 1964; Langman, *Select. Guide Lit. Flow. Pl. Mex.* 748 & 1010. 1964; Moldenke, *Phytologia* 11: 336, 338, 341, & 344. 1965.

Fearing & Thompson describe the corolla of this plant as "very light-blue". They found the plant in dense pine forests in black volcanic soil. Breedlove encountered it on rocky slopes. In Shreve & Wiggins (1964) its distribution is said to be "In diverse soils and habitats, Lower Sonoran to Hudsonian Zones, from Pima County, Arizona, through most of Mexico including southern Baja California to El Salvador; ascending to 10,500 feet."

Additional citations: MEXICO: Chiapas: Breedlove 5984 (Z). Morelos: Fearing & Thompson 131 (Lw).

VERBENA CATHARINAE Moldenke

Additional bibliography: Reitz, *Sellowia* 11: 57 & 134 (1959) and 12: 157. 1960; Moldenke, *Phytologia* 10: 101. 1964.

Common names recorded for the species are "camaradinha", "formosa sem dote", and "jurupeba", but these are applied also to most members of this genus in southern Brazil.

VERBENA CHEITMANIANA Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 101 (1964) and 11: 123. 1964.

VERBENA CHILENSIS Moldenke

Additional bibliography: R. A. Phil., *Anal. Univ. Chil.* 35: 190--191. 1870; Muñoz Pizarro, *Espec. Plant. Descr. Philippi* 111. 1960; Moldenke, *Phytologia* 10: 101. 1964.

The isotype photographed by Macbride as his type photograph number 17417 was deposited in the herbarium of the Botanisches Museum at Berlin, now unfortunately destroyed.

Additional citations: CHILE: Mendoza: R. A. Philippi s.n. [Mendoza; Herb. Mus. Nac. Hist. Nat. Chile 42446 & 54790; Macbride photos 17417] (N--photo of isotype).

VERBENA CILIATA Benth.

Additional synonymy: Verbena ciliata var. ciliata [Moldenke] in Shreve & Wiggins, *Veg. & Fl. Son. Des.* 2: 1244. 1964.

Additional bibliography: G. Rzedowski, *Act. Cientif. Potos.* 4: 65 & 91. 1960; Jones, Rowell, & Johnston, *Flow. Pl. & Ferns Tex. Coast. Bend* 143--144. 1961; Moldenke, *Résumé Suppl.* 11: 3 & 4. 1964; Moldenke in Shreve & Wiggins, *Veg. & Fl. Son. Des.* 2: 1244. 1964; Moldenke, *Phytologia* 10: 101--102, 148, & 283 (1964) and 11: 32, 43, 48, 49, 105, 156, 158, 188, & 189 (1964), and 11: 308, 310, & 326. 1965.

McGregor describes the corollas of this plant as "reddish", while F. B. Jones says for his no. 1867: "corollas white in contrast to the usual violet-blue [of var. longidentata] which was present at same locality; several specimens of white form noted; prob. albino of V. bipinnatifida." He found the plant in clay soil along roadsides; McGregor found it prostrate in dry level rocky grassland; and Maguire reports it "on rocky granitic slopes with oaks" at 6,000 feet altitude. These collectors found it flowering and fruiting in April and May. It has been misidentified and distributed in herbaria as V. bipinnatifida Nutt. and as V. wrightii A. Gray.

Shreve & Wiggins (1964) describe its natural distribution as "On flats, sandy plains, dry limestone hills, and rocky slopes, mainly above the Sonoran Desert (ascending to nearly 12,000 feet) from Arizona to Oklahoma and Texas and south to Oaxaca, with isolated records from Tennessee and South Dakota. Entering the margin of the Sonoran Desert near Tucson and Aguila, Arizona."

The F. B. Jones 4478 and C. M. Rowell 4702, distributed as V. ciliata, are actually var. longidentata Perry.

Additional citations: TEXAS: San Patricio Co.: F. B. Jones 1867 (Ww). NEW MEXICO: Otero Co.: D. B. Dunn 3276 (Lb--48447).

Socorro Co.: D. B. Dunn 3039 (Lb--48469); Dunn & Levine 3439 (Lb-48192); Dunn & Lint 4384 (Lb--53810). Torrance Co.: D. B. Dunn 6445 (Lb--40930). ARIZONA: Graham Co.: B. Maguire 10542 (N). MEXICO: Jalisco: R. L. McGregor 16626 (Lw).

VERBENA CILIATA var. LONGIDENTATA Perry

Additional bibliography: Moldenke, *Phytologia* 10: 102 & 283 (1964) and 11: 32 & 43. 1964.

Recent collectors have found this plant in clay of open pastures and in sandy pastures, while Rowell notes it as "occasional to locally frequent in sandy loam and tight soils". His no. 4702 is said to have had "pale-purple" corollas. The plant has been found in flower in February and March and in fruit in March. Herbarium material has been misidentified and distributed as V. bipinnatifida Nutt., V. canadensis (L.) Britton, and V. ciliata Benth. Runyon 2497 was previously cited by me as V. canadensis, but this is erroneous.

Additional citations: TEXAS: Bee Co.: F. B. Jones 2842 (Fj). Cameron Co.: R. Runyon 2497 (N, N, N). San Patricio Co.: F. B. Jones 4445 (Fj), 4478 (Ww); C. M. Rowell 4702 (Ww).

VERBENA CILIATA var. PUBERA (Greene) Perry

Additional bibliography: Moldenke, *Phytologia* 10: 102 (1964) and 11: 48. 1964; Moldenke in Shreve & Wiggins, *Veg. & Fl. Son. Des.* 2: 1245. 1964.

Maguire, Richards, & Moeller assert that this plant is "common in grass of Hilaria mutica type, with Prosopis, Yucca elata, on sandy flats", flowering and fruiting in May. In Shreve & Wiggins (1964) its distribution is given as "In cindery soil, on sandy clay flats, sandy and grassy plains, and washes, mainly Upper Sonoran Zone, southern California to western Texas. Possibly entering the Sonoran Desert along the eastern margin in Arizona."

Additional citations: NEW MEXICO: Grant Co.: Maguire, Richards, & Moeller 11503 (N).

VERBENA CLAVATA Ruiz & Pav.

Additional bibliography: Soukup, *Biota* 5: 42 & 134. 1964; Moldenke, *Phytologia* 10: 102. 1964.

Soukup (1964) records the vernacular name "tacpa".

VERBENA CLAVATA f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, *Phytologia* 9: 32. 1963; Soukup, *Biota* 5: 42. 1964.

VERBENA CLAVATA var. CASMENSIS Moldenke

Additional bibliography: Soukup, *Biota* 5: 42. 1964; Moldenke, *Phytologia* 10: 102. 1964.

xVERBENA CLEMENSORUM Moldenke

Additional bibliography: Moldenke, *Phytologia* 9: 33--34 (1963)

and 10: 102 & 210. 1964.

VERBENA CLOVERAE Moldenke

Additional bibliography: Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 1144. 1961; Moldenke, Résumé Suppl. 11: 3. 1964; Moldenke, Phytologia 10: 102 & 178 (1964) and 11: 13. 1964; A. L. Moldenke, Phytologia 10: 238. 1964.

Recent collectors have found this species on sandy slopes near creeks, on sandy road shoulders, in open pastures, and scattered around depressions in dry rocky mesquite range. Williges calls it "rare" in San Patricio County, Texas, while F. B. Jones encountered it "usually on slopes" in Kleberg County. The flowers on R. L. McGregor 16764 are described as "blue".

Additional citations: TEXAS: Bee Co.: F. B. Jones 4547 (Ww). Kleberg Co.: F. B. Jones 2977 (Ww), 3801 (Ww). San Patricio Co.: F. B. Jones 6177 (Ww); Williges 5c (Ww). Webb Co.: R. L. McGregor 16764 (Lw).

xVERBENA CONATA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 103 & 210. 1964.

xVERBENA CORRUPTA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 103 & 498. 1964.

VERBENA CORYMBOSA Ruiz & Pav.

Additional bibliography: Muñoz Pizarro, Sin. Fl. Chil. 199. 1959; Moldenke, Phytologia 10: 103. 1964; Soukup, Biota 5: 42. 1964; A. & I. Nehrling, Pict. Book Perenn. 131. 1964.

xVERBENA COVASII Moldenke

Additional bibliography: Moldenke, Phytologia 10: 103 (1964), 11: 135 (1964), and 11: 290. 1965.

VERBENA CRITHMIFOLIA Gill. & Hook.

Additional bibliography: Hieron., Bol. Acad. Nac. Córdoba 4: 409. 1881; Hieron., Pl. Diaph. Fl. Argent. 215. 1882; Moldenke, Phytologia 10: 103, 110, 120, & 288. 1964.

VERBENA CUNEIFOLIA Ruiz & Pav.

Additional bibliography: Soukup, Biota 5: 42 & 134. 1964; Moldenke, Phytologia 10: 103, 287, & 296 (1964) and 11: 158 & 162. 1964.

Soukup (1964) records the common name "china verbena".

xVERBENA DEAMII Moldenke

Additional bibliography: Steyerl., Fl. Mo. 1260 & 1261, map 1844. 1963; Moldenke, Phytologia 10: 104 & 311 (1964) and 11: 202 & 203. 1964; Moldenke, Résumé Suppl. 10: 1. 1964.

Material of this hybrid has been misidentified and distributed

in herbaria as V. canadensis (L.) Britton. On the other hand, the W. H. Horr 4679, distributed as xV. deamii, is actually V. hastata L.

Additional citations: KANSAS: Gray Co.: W. H. Horr 3086 (Lw).

VERBENA DELTICOLA Small

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1243. 1964; Moldenke, Phytologia 10: 104 (1964), 11: 32, 43, & 44 (1964), and 11: 326. 1965.

The R. Runyon 2625, cited below, was erroneously cited in Phytologia 8: 465 (1963) as V. canadensis (L.) Britton. In Shreve & Wiggins (1964) V. delticola is described as being found "In sandy, adobe, clay, loam, or alluvial soils, or even limestone or rocky areas in diverse situations, Sonoran Zone, central Sonora to Texas and south to Puebla and Vera Cruz, Mexico. Often in cultivated ground in fields and orchards."

Additional citations: TEXAS: Hidalgo Co.: R. Runyon 2625 (N, N).

VERBENA DEMISSA Moldenke

Additional bibliography: Moldenke, Biol. Abstr. 27: 2026. 1953; Moldenke, Phytologia 9: 202. 1963.

VERBENA DISSECTA Willd.

Additional & emended bibliography: Reitz, Sellowia 13: 67 & 110. 1961; Moldenke, Phytologia 10: 104, 148, 189, 295, 299, & 311 (1964) and 11: 20, 24, 25, 61, 122, & 189 (1964), and 11: 243, 246, 270, 273, 276, 280, 290, & 291. 1965.

The type specimen of this species, photographed by Macbride as his type photograph no. 17460, was originally deposited in the herbarium of the Botanisches Museum at Berlin, but is now destroyed. Cárdenas found this species growing on rocky slopes.

Additional citations: BOLIVIA: Cochabamba: M. Cárdenas 5578 (W--2429778). CHILE: Province undetermined: Née s.n. [Herb. Willdenow 11139; Macbride photos 17460] (N--photo of type).

xVERBENA DISSOLUTA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 104 & 498 (1964) and 11: 290. 1965.

VERBENA DOMINGENSIS Urb.

Additional bibliography: Moldenke, Phytologia 9: 203 (1963) and 10: 212, 217, 219, & 230. 1964.

Additional citations: HISPANIOLA: Dominican Republic: B. Augusto 1047 (N), 1087 (N), 1109 (N).

VERBENA EHRENBERGIANA Schau.

Additional bibliography: Schlecht., Linnaea 23: 714--722. 1850; Schlecht., Ann. Sci. Nat., ser. 3, 14: 342--344. 1850; Langman, Select. Guide Lit. Flow. Pl. Mex. 680 & 1010. 1964; Moldenke, Phytologia 10: 104 & 140 (1964) and 11: 338. 1965.

McGregor and his associates found this plant "scattered in open

places in dry rocky open wooded hillside" in Nuevo León and "scattered" on rocky very moist open hillsides in San Luis Potosí. Macbride's type photograph no. 17414 is of the type specimen in the herbarium of the Botanisches Museum at Berlin, now destroyed.

Additional citations: MEXICO: México: Ehrenberg 713 [Macbride photos 17414] (N--photo of type). Nuevo León: McGregor, Harms, Robinson, R. del Rosario, & Segal 156 (Lw). San Luis Potosí: McGregor, Harms, Robinson, R. del Rosario, & Segal 906 (Lw).

VERBENA ELEGANS H.B.K.

Additional bibliography: Moldenke, *Phytologia* 10: 105 (1964), 11: 25 (1964), and 11: 308. 1965.

McGregor and his associates describe the flowers of this species as "purple" (176), "dark-purple" (51), or "reddish-blue" (254) on open mountainsides, and, in Nuevo León, "scattered in dry rocky open wooded hillside" or in "moist open forested area, well scattered".

Additional citations: MEXICO: Nuevo León: McGregor, Harms, Robinson, R. del Rosario, & Segal 51 (Lw), 176 (Lw), 254 (Lw). San Luis Potosí: R. L. McGregor 16662 (Lw).

VERBENA ELEGANS var. ASPERATA Perry

Additional bibliography: Moldenke, *Phytologia* 10: 105 (1964) and 11: 25. 1964; Moldenke in Shreve & Wiggins, *Veg. & Fl. Son. Des.* 2: 1244. 1964.

The Gizantoro s.n. [9.66] collection cited in *Phytologia* 9: 203 (1963) as from an undetermined locality, appears, after a deciphering of the longhand inscription by my colleagues at Lund, to have been collected in Germany from plants which had escaped from cultivation there.

In Shreve & Wiggins (1964) the distribution of this variety is given as "On limestone or even bare sandstone outcroppings in mountains and canyons, in various soils and situations but characteristic of arroyo margins, ascending to 8,000 feet, chiefly Upper Sonoran and Transition Zones, Sonora to Texas, Hidalgo, and Zacatecas but entering the Sonoran Desert near Hermosillo and Magdalena, Sonora."

xVERBENA ENGELMANNII Moldenke

Additional & emended synonymy: Verbena engelmannii Moldenke, *Résumé Suppl.* 2: 11, in syn. 1960; Steyerl., *Fl. Mo.* 1258, map 1840. 1963. Verbena hybrida Pech. ex Moldenke, *Résumé Suppl.* 11: 8, in syn. 1964 [not xV. hybrida Voss, 1873]. Verbena xengelmannii Moldenke ex Henry & Buker, *Trillia* 12: 125, sphalm. 1964.

Additional bibliography: Steyerl., *Fl. Mo.* 1258, map 1840. 1963; Moldenke, *Résumé Suppl.* 10: 1 (1964) and 11: 1, 2, & 8. 1964; Henry & Buker, *Trillia* 12: 125. 1964; Moldenke, *Phytologia* 10: 105--106, 109, 130, 154, & 160 (1964), 11: 102, 127, & 201 (1964), and 11: 336--338 & 340--342. 1965.

Recent collectors have found this natural hybrid in flower and fruit in July and August. McGregor found it "scattered among parents in low place in prairie" in Greenwood County, Kansas, and "with parents in ravine in prairie" in Barber County. Poindexter encountered it in a "brushy overgrazed pasture" in Douglas County and reports its pollen fertility as 41 percent and the chromosome number as $n = 7$. Morley found it "scattered in creek bottom in good loam soil" in Republic County and describes the corolla as "light lavender with lighter center" or "light-lavender with lighter throat when fresh". My son and I observed it in thirteen localities in six states this past summer and in all cases found it to be very distinct from both parents not only in the color of the corollas, but also in its greater height than either parent and its wide-spreading inflorescences.

Additional citations: NEW JERSEY: Passaic Co.: A. R. Moldenke 785 (Lw). ILLINOIS: Edgar Co.: A. R. Moldenke 811 (Lw). Macon Co.: A. R. Moldenke 821 (Lw, Ut, Z, Z). Pike Co.: A. R. Moldenke 836 (Lw). Scott Co.: A. R. Moldenke 832 (Lw). IOWA: Clayton Co.: A. R. Moldenke 989 (Lw). Iowa Co.: A. R. Moldenke 974 (Lw, Ut). Marion Co.: A. R. Moldenke 953 (Lw). Poweshiek Co.: A. R. Moldenke 965 (Lw). Warren Co.: A. R. Moldenke 947 (Lw, Ut). MICHIGAN: Montcalm Co.: A. R. Moldenke 1036 (Lw). WISCONSIN: Grant Co.: A. R. Moldenke 999 (Lw, Ut). KANSAS: Barber Co.: R. L. McGregor 14611 (Lw). Brown Co.: A. R. Moldenke 912 (Lw). Douglas Co.: J. D. Poindexter 191-23 (Lw). Greenwood Co.: R. L. McGregor 14700 (Lw). Republic Co.: G. E. Morley 804 (Lw), 813 (Lw). MISSOURI: Pike Co.: Fritchey 563 (Lb--4175). LOCALITY OF COLLECTION UNDETERMINED: Collector undesignated s.n. (Lb--27615).

VERBENA EPHEDROIDES Cham.

Additional bibliography: Hieron., Bol. Acad. Nac. Córdoba 4: 408. 1881; Hieron., Pl. Diaph. Fl. Argent. 214. 1882; Moldenke, Phytologia 10: 106, 122, & 304 (1964) and 11: 121. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

xVERBENA FABRICATA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 106 (1964) and 11: 337. 1965.

VERBENA FASCICULATA Benth.

Additional bibliography: Soukup, Biota 5: 42. 1964; Moldenke, Phytologia 10: 106. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

xVERBENA FERAX Moldenke

Additional bibliography: Moldenke, Phytologia 10: 106 (1964) and 11: 47. 1964.

VERBENA FERREYRAE Moldenke

Additional bibliography: Moldenke, Phytologia 9: 118. 1963;

Soukup, Biota 5: 42. 1964.

VERBENA FILICAULIS Schau.

Additional bibliography: Moldenke, Phytologia 10: 106 & 120. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

VERBENA FLAVA Gill. & Hook.

Additional bibliography: R. A. Phil., Anal. Univ. Chil. 35: 191. 1870; Moldenke, Phytologia 10: 106--107. 1964.

VERBENA GALAPAGOSSENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 9: 124 (1963), 11: 188 (1964), and 11: 317. 1965.

VERBENA GENTRYI Moldenke

Additional bibliography: Moldenke, Phytologia 10: 107. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 516 & 1010. 1964.

VERBENA GLABRATA H.B.K.

Additional bibliography: Soukup, Biota 5: 42. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 107 (1964) and 11: 317. 1965.

VERBENA GLANDULIFERA Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 107 & 148 (1964) and 11: 273. 1965.

The Jørgensen 1026 collection cited in Phytologia 9: 129 (1963) is a mixture with V. tenera Spreng.

VERBENA GLUTINOSA Kuntze

Additional bibliography: Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 107. 1964.

The isotype of this species photographed by Macbride as his type photograph no. 17418 was deposited in the herbarium of the Botanisches Museum at Berlin, but is now destroyed.

Additional citations: ARGENTINA: Mendoza: Kuntze 2 [Macbride photos 17418] (N--photo of isotype).

xVERBENA GONZALEZI Moldenke

Additional bibliography: Moldenke, Phytologia 10: 107 & 301. 1964.

VERBENA GOODDINGII Briq.

Emended synonymy: Verbena gooddingii var. gooddingii Briq. ex Moldenke, Résumé Suppl. 3: 38, in syn. 1962; Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1243. 1964.

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1243. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 107, 306, & 307 (1964), 11: 32, 157, 158, & 200 (1964), and 11: 326. 1965.

In Shreve & Wiggins (1964) the distribution of this species is

given as "In sandy, limestone, and granitic soil on dry rocky slopes or gravelly hillsides, dry sandy washes, canyon floors, ravines, roadbanks, gravel bars, and grasslands, Lower Sonoran to Arid Transition Zones, southern Utah and Nevada to southern California, Sonora, and northern Baja California."

VERBENA GOODDINGII var. NEPETIFOLIA Tidestr.

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1243--1244. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 107--108 (1964), 11: 32 & 157 (1964), and 11: 326. 1965.

In Shreve & Wiggins (1964) the distribution of this variety is given as "In granitic soil, dry and rocky slopes, red clay hillsides, the sides of ravines, on banks of small streams, and along arid roadsides, often associated with Prosopis and Simmondsia, Lower and Upper Sonoran Zones, from Arizona and southern California to central Baja California and Nuevo León."

xVERBENA GOODMANI Moldenke

Additional bibliography: Moldenke, Phytologia 10: 108 (1964) and 11: 203. 1964.

VERBENA GRACILESCENS (Cham.) Herter

Additional bibliography: Moldenke, Phytologia 10: 108, 210, 211, 216, 217, & 296 (1964) and 11: 158 & 162. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

VERBENA GRACILIS Desf.

Additional bibliography: Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 108, 112, 179, 182, & 186 (1964), 11: 13 & 14 (1964), and 11: 256 & 308. 1965.

VERBENA GYNOBASIS Wedd.

Additional bibliography: Muñoz Pizarro, Espec. Plant. Descr. Philippi 110. 1960; Moldenke, Phytologia 9: 158--160. 1963; Soukup, Biota 5: 42. 1964.

The Philippi specimen photographed by Macbride as his type photograph no. 17419 was deposited in the herbarium of the Botanisches Museum at Berlin, but is now unfortunately destroyed.

Additional citations: CHILE: Tarapacá: R. A. Philippi s.n. [Si-baya; Macbride photos 17419] (N--photo).

VERBENA GYNOBASIS var. STRIGOSA Wedd.

Additional bibliography: Moldenke, Phytologia 10: 108. 1964; Soukup, Biota 5: 42. 1964.

VERBENA HALEI Small

Additional bibliography: Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 144. 1961; Irwin, Roadside Flow. Tex. 190. 1961; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1238--1239. 1964; Moldenke, Phytologia 10: 99, 108, 140, 141, 178, 179,

182, 186, 192, 193, 210, 211, 216--218, 304, & 502 (1964) and 11: 13, 14, 111, 116, 128, 136, 164, 200, & 203. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

The corollas are described on Duncan 2-214 as "lavender-purple", on Rowell 4779 as "pale-purple", and on McGregor 16762 as "blue".

Recent collectors have found this species in and around abandoned trick gardens, on low ridges, along ditches, in dry rocky mesquite range, in sandy soil of rocky xeric hillsides with Yucca, juniper, and cactus, on sandy banks, and in clayey pasture openings. Beamer reports it as "very common along roadsides and in pastures" in Montgomery County, Texas; Wagenknecht refers to it as a "common weed along edge of roadsides, grassy areas and fencerows" in Alachua County, Florida; while in San Patricio County, Texas, it is said by Rowell to be an "occasional herb in clay soils", "occasional in tight clay loam", and "frequent in black loam".

The F. B. Jones 1925 distributed as V. halei is actually V. runyonii Moldenke. In Shreve & Wiggins (1964) the distribution of V. halei is given as "In sandy or calcareous meadows, prairies, fields, and woodlands, on rocky hillsides and along roadsides, Sonoran Zones, from Alabama to Oklahoma and from south-central Arizona to Querétaro."

Goodman reports that the pale purplish-blue flowers on his no. 7470 are much larger than the flowers of the V. halei of southern Oklahoma. Perhaps field study is indicated here to determine if an undescribed variety is involved. In a letter to me dated December 26, 1964, he says "I suspect that you are quite right -- that V. halei is variable. I've known it best in its small flowered form in Marshall Co., Oklahoma."

Additional citations: GEORGIA: Sapelo Island: W. H. Duncan 20214 (Lb--42773). FLORIDA: Alachua Co.: B. L. Wagenknecht 2599 (Lw). MISSISSIPPI: Jackson Co.: J. Skehan s.n. [Ocean Springs, June 1892; Seymour & Earle 109] (Lb--16414). LOUISIANA: Cameron Par.: S. M. Tracy 8709 (Lb--27618). Rapides Par.: Demaree 47327 (Lw). TEXAS: Angelina Co.: R. L. McGregor 15558 (Lw). Burnet Co.: E. W. Lathrop 2046 (Lw). Montgomery Co.: Beamer s.n. [April 30, 1953] (Lw). San Patricio Co.: G. J. Goodman 7470 (Z); F. B. Jones 4558 (Ww); C. M. Rowell 4779 (Ww), 4869 (Ww), W.51 (Ww). Webb Co.: R. L. McGregor 16762 (Lw).

VERBENA HASSLERANA Briq.

Additional bibliography: Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 108 & 498 (1964) and 11: 315. 1965.

Pedersen found this species growing in wet ground and reports that its flowers were "purplish-pink".

Additional citations: PARAGUAY: Pedersen 5234 (W--2432879).

VERBENA HASTATA L.

Additional synonymy: Verbena hastata f. hastata Steyererm., Fl. Mo. 1258. 1963. Verbena lastata Taylor & Hamblin, Handb. Wild Fl.

Cult. 294, sphalm. 1963.

Additional bibliography: Schwencke, Zytol. Untersuch. Verbenac. 3, 12--14, 19, 26, 33, & 43, fig. 11. 1931; Patermann, Beitr. Zytol. Verbenac. 6, 10, 12--14, 19, 26, & 43. 1935; T. B. Mitchell, Bees East. U. S. 1 [N. C. Agr. Exp. Sta. Tech. Bull. 141]: 292. 1960; Anon., Algonquin Prov. Park Mus. Check-list 19. 1957; Anon., Billie Bear Plant List 8. 1961; Steyerm., Fl. Mo. 1257--1260, map 1841, pl. 302, fig. 5. 1963; Pinkava, Ohio Journ. Sci. 63: 125. 1963; Taylor & Hamblin, Handb. Wild. Fl. Cult. 168, 257, 279, & 294. 1963; Selle, Prog. & Abstr. Stud. Research Rep. 12th Annual Mann High School Biol. Cong. 10. 1964; Moldenke, Résumé Suppl. 10: 1 (1964) and 11: 1--3 & 8. 1964; A. & I. Nehrling, Pict. Book Perenn. 131. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 105, 106, 108--110, 129, 130, 152--155, 192, 210, 218, 219, & 307--311 (1964), 11: 101--103, 105, 113--118, 128, 163, 164, 167, 191, 195, 196, & 200--203 (1964), and 11: 233, 328, & 335--343. 1965.

Additional illustrations: Schwencke, Zytol. Untersuch. Verbenac. fig. 11. 1931; Steyerm., Fl. Mo. pl. 302, fig. 5. 1963; Taylor & Hamblin, Handb. Wild Fl. Cult. 168. 1963.

It is of interest to note that both Schwencke (1931) and Patermann (1935) report the haploid number of chromosomes for this species as 6. Poindexter gives $n = 7$ for his nos. 35, 195-13, and 229-13, with pollen fertility of 93 percent and 98 percent for the last two collections.

Recent collectors in Kansas have found this plant in boggy ground along the edges of springs, in sedge meadows, moist grassy areas, overgrazed pastures, moist sandy prairie ravines, sandy soil in low marshy areas along creeks, low places near small streams, along creek banks in mixed forest association, wet marshy places, sandy waste and stabilized sanddune pastures, in rocky prairie pastures in association with Lactuca scariola, Poinsettia dentata, and Tragopogon, and with Rudbeckia on creekbanks. McGregor reports it from "sandy bluestem pasture, moist ravine, scattered in the area" in Franklin County, "small colony on sandy riverbank" in Cheyenne County, "large colony in low place in prairie" in Greenwood County, "small colony in ravine in prairie" in Morris County, "overgrazed pasture in bluestem prairie, common in moist ravines" in Washington County, "common in low places in pastures" in Douglas County, and "abundant in low places in sand dunes" in Rice County, Kansas. Ungar found it "common on roadsides" and "scattered but common on road edges" in Stafford County. Horr found it in "alluvium with good soil mixture, local colonies" and "common in rich moist alluvium" of thickets on floodplains in Cheyenne County, "scattered" in wet sand of marshy areas and "common" in dry loam of grassland pastures in Washington County, "scattered in moist loam of floodland" in Meade County, "scattered in wet loam of roadside ditches" in Jefferson County, and "common" in artesian marsh in Meade County. In Republic County it was found by Morley "scattered near center of marshy area" and "common along head of lower seepage area". Its corollas are described as "purple" on W. H. Horr 4648 and as "blue"

on his no. 4697. This same collector regarded his nos. 4436, 4648, and 4697 as xV. blanchardi Moldenke and his no. 4679 as xV. deamii Moldenke.

My son and I noted this past summer that when this species grows in dry pasturelands, as it frequently does in the midwestern portions of its range, it develops a "field form" with the leaf-blades more canescent-puberulous beneath, slightly rough above, and the stem many-branched with many groups of terminal inflorescences more or less equally dense as the main one. Examples of this field form may be seen in A. R. Moldenke 905, 922, 927, 967, 971, 981, 983, 988, 1014, 1018, 1026, 1035, 1040, & 1046 and H. N. Moldenke 21937.

Mitchell (1960) reports that the bee, Calliopsis nebraskensis Crawford, feeds abundantly on the flowers of this species, the female taking pollen and nectar, but the male taking only nectar.

Taylor & Hamblin (1963) say that this is a plant for "moist woods" and that "When growing in large colonies, blue vervain casts a violet mist over the landscape. Single specimens are not so effective since only a few flowers are out at one time. This, the tallest of the verbenas, is of value in a planting of wild flowers in a moist area with such robust companions as boneset, Joe-Pye-weed, and ironweed.....This species is found in moist places in moderately acid soil from Nova Scotia to British Columbia, south to Florida, and west to Nebraska and Arizona."

Pinkava (1963) reports V. hastata from Sandusky County, Ohio. Steyermark (1963) records it from Adair, Andrew, Atchison, Audrain, Buchanan, Caldwell, Carroll, Cedar, Chariton, Clay, Dade, DeKalb, Franklin, Gentry, Harrison, Holt, Howell, Jefferson, Knox, Laclede, Lewis, Linn, Livingston, Macon, Mercer, Mississippi, Monroe, Montgomery, Newton, Oregon, Ozark, Perry, Pettis, Phelps, Pike, Putnam, Randolph, Ray, Saint Charles, Saint Clair, Saline, Schuyler, Shelby, Sullivan, Taney, Vernon, Warren, and Webster Counties, Missouri, on the basis of specimens preserved in the herbarium of the Missouri Botanical Garden at St. Louis, not yet seen by me. On p. 1261 of his work he says "A specimen from Grundy County (pastures, July 28, 1937, D. R. Crookshanks 1442, in U. Mo. Herb.) appears to be a hybrid between V. bracteata and V. hastata." I have examined this specimen and regard it as xV. perriana Moldenke. The V. L. Harms 903 & 1107, R. L. McGregor 14858, J. D. Poindexter 201-3, and B. L. Wagenknecht 3149, distributed as V. hastata, all appear to be var. scabra Moldenke; D. B. Dunn 3179, 3217, 6138, 6215, & 6703 are V. macdougallii Heller; W. H. Horr 4691 and R. L. McGregor 14385 are xV. rydbergii Moldenke; and Drouet s.n. [July 12, 1931] and B. L. Wagenknecht 1890 are V. stricta Vent.

Additional citations: QUEBEC: Chambly Co.: A. Dubois 220 (N). ONTARIO: Elgin Co.: A. R. Moldenke 1045 (Lw). Essex Co.: A. R. Moldenke 1041 (Lw). Haldimand Co.: A. R. Moldenke 1048 (Lw). Kent Co.: A. R. Moldenke 1044 (Lw). Lambton Co.: Gaiser 3880G (Z), 4187G (Z),

4296Bos (Z). Norfolk Co.: A. R. Moldenke 1046 (Lw). Welland Co.: A. R. Moldenke 1049 (Lw). Walpole Island: Gaiser 4091W (Z), 4096W (Z), 4119W (Z), 4138W (Z). MASSACHUSETTS: Suffolk Co.: F. C. Seymour s.n. [Long Meadow, July 17, 1908] (Lb--27614). NEW YORK: Allegany Co.: A. R. Moldenke 1054 (Lw). Broome Co.: A. R. Moldenke 1062 (Lw). Cattaraugus Co.: A. R. Moldenke 1051 (Lw). Chautauqua Co.: Hayhurst s.n. [Fredonia, July 30, 1902] (Lb--27613). Chemung Co.: A. R. Moldenke 1057 (Lw). Chenango Co.: A. R. Moldenke 1063 (Lw). Delaware Co.: A. R. Moldenke 1064 (Lw); Wilkins s.n. [Stamford, August 5, 1919] (N). Erie Co.: A. R. Moldenke 1050 (Lw). Orange Co.: A. R. Moldenke 1066 (Lw). Rockland Co.: Lehr 412a (N), 412b (N). Schuyler Co.: A. R. Moldenke 1058 (Lw). Steuben Co.: A. R. Moldenke 1056 (Lw). Sullivan Co.: A. R. Moldenke 1065 (Lw). Tioga Co.: A. R. Moldenke 1061 (Lw). Tompkins Co.: A. R. Moldenke 1060 (Lw). PENNSYLVANIA: Armstrong Co.: H. N. Moldenke 21902 (Lw). Centre Co.: A. R. Moldenke 786 (Lw). Clarion Co.: H. N. Moldenke 21900 (Lw). Clearfield Co.: H. N. Moldenke 21895 (Lw). Columbia Co.: H. N. Moldenke 21891 (Lw). Jefferson Co.: H. N. Moldenke 21897 (Lw). Luzerne Co.: H. N. Moldenke 21890 (Lw). Northumberland Co.: H. N. Moldenke 21896 (Lw). OHIO: Darke Co.: H. N. Moldenke 21906 (Lw). Delaware Co.: A. R. Moldenke 796 (Lw). Harrison Co.: A. R. Moldenke 789 (Lw). Knox Co.: H. N. Moldenke 21903 (Lw). Miami Co.: A. R. Moldenke 798 (Lw). Morrow Co.: H. N. Moldenke 21904 (Lw). Tuscarawas Co.: A. R. Moldenke 790 (Lw). Union Co.: A. R. Moldenke 792 (Lw). ILLINOIS: Cass Co.: Geyer s.n. [Beardstown, July 1842] (Lb--27610). Douglas Co.: A. R. Moldenke 813 (Lw). Edgar Co.: A. R. Moldenke 810 (Lw). Macon Co.: A. R. Moldenke 818 (Lw). Morgan Co.: A. R. Moldenke 828 (Lw). Moultrie Co.: A. R. Moldenke 814 (Lw). Pike Co.: A. R. Moldenke 834 (Lw), 838 (Lw, Ut). Sangamon Co.: A. R. Moldenke 824 (Lw). Scott Co.: A. R. Moldenke 829 (Lw). INDIANA: Boone Co.: A. R. Moldenke 807 (Lw). Hamilton Co.: A. R. Moldenke 804 (Lw). Henry Co.: H. N. Moldenke 21910 (Lw). Madison Co.: A. R. Moldenke 802 (Lw). Pulaski Co.: Friesner 9768 (Lb--30184). Randolph Co.: H. N. Moldenke 21907 (Lw). IOWA: Adair Co.: A. R. Moldenke 938 (Lw). Buchanan Co.: A. R. Moldenke 986 (Lw). Cass Co.: H. N. Moldenke 21937 (Lw). Clayton Co.: A. R. Moldenke 988 (Lw). Delaware Co.: A. R. Moldenke 983 (Lw). Iowa Co.: A. R. Moldenke 971 (Lw). Johnson Co.: Huang 2580 (Lb--54991). Linn Co.: A. R. Moldenke 979 (Lw), 981 (Lw, Ut). Madison Co.: A. R. Moldenke 941 (Lw). Mahaska Co.: A. R. Moldenke 962 (Lw, Ut). Marion Co.: A. R. Moldenke 954 (Lw). Mills Co.: A. R. Moldenke 925 (Lw), 929 (Lw). Pottawatomie Co.: A. R. Moldenke 922 (Lw). Poweshiek Co.: A. R.

Moldenke 967 (Lw, Ut). Warren Co.: A. R. Moldenke 946 (Lw), 949 (Lw). MICHIGAN: Charlevoix Co.: A. R. Moldenke 1027 (Lw). Dickinson Co.: A. R. Moldenke 1026 (Lw). Grand Traverse Co.: Dieterle 1374 (S). Gratiot Co.: H. N. Moldenke 21945 (Lw). Ingham Co.: Collector undesignated s.n. [Lansing, 8-15-1887] (Lb--27612); A. R. Moldenke 1037 (Lw). Ionia Co.: H. N. Moldenke 21946 (Lw). Isabella Co.: A. R. Moldenke 1031 (Lw). Jackson Co.: A. R. Moldenke 1038 (Lw). Kent Co.: Daniels s.n. [Alto, Jul. 1898] (Lb--27611). Mecosta Co.: A. R. Moldenke 1030 (Lw). Menominee Co.: A. R. Moldenke 1024 (Lw). Montcalm Co.: A. R. Moldenke 1035 (Lw). Osceola Co.: A. R. Moldenke 1029 (Lw). Washtenaw Co.: A. R. Moldenke 1040 (Lw). Wayne Co.: A. R. Moldenke 1039 (Lw). WISCONSIN: Crawford Co.: A. R. Moldenke 1005 (Lw). Dane Co.: A. R. Moldenke 1008 (Lw); Rickett s.n. [Madison, July 14, 1926] (Lb--27604). Fond du Lac Co.: A. R. Moldenke 1014 (Lw). Grant Co.: A. R. Moldenke 1000 (Lw). Green Lake Co.: A. R. Moldenke 1016 (Lw). Iowa Co.: A. R. Moldenke 1004 (Lw). Marinette Co.: A. R. Moldenke 1022 (Lw). Oconto Co.: A. R. Moldenke 1023 (Lw). Outagamie Co.: A. R. Moldenke 1020 (Lw). Shawano Co.: A. R. Moldenke 1021 (Lw). Wau-paca Co.: A. R. Moldenke 1019 (Lw). Waushara Co.: A. R. Moldenke 1018 (Lw). MINNESOTA: Becker Co.: Terrell 1777 (W--2388680). Ottertail Co.: P. Johnson 545 (Lb--36411). KANSAS: Brown Co.: A. R. Moldenke 913 (Lw). Cherokee Co.: E. L. Richards 1888 (Lw). Cheyenne Co.: W. H. Horr 4679 (Lw), 4697 (Lw); R. L. McGregor 13587 (Lw), 15221 (Lw). Comanche Co.: R. L. McGregor 14676 (Lw). Dickinson Co.: A. R. Moldenke 906 (Lw). Douglas Co.: R. L. McGregor 9668 (Lw), 14570 (Lw); J. D. Poindexter 33 (Lw), 229-13 (Lw). Ellis Co.: E. Runyon 280 (Lb--33195). Ellsworth Co.: B. L. Wagenknecht 1927 (Lw). Franklin Co.: Hetzer s.n. [24 Aug. 1949] (Lw); R. L. McGregor 12699 (Lw). Greenwood Co.: R. L. McGregor 14698 (Lw). Harper Co.: R. L. McGregor 14577 (Lw); A. R. Moldenke 890 (Lw). Jefferson Co.: W. H. Horr 4228 (Lw); A. R. Moldenke 905 (Lw). Kingman Co.: A. R. Moldenke 894 (Lw). Kiowa Co.: R. L. McGregor 15155 (Lw). Meade Co.: Fearing & Latham s.n. [August 17, 1950] (Lw); W. H. Horr 3302 (Lw), 3540 (Lw). Morris Co.: R. L. McGregor 14105 (Lw). Neosho Co.: W. H. Horr 6723 (Lw). Reno Co.: J. D. Poindexter 195-13 (Lw). Republic Co.: G. E. Morley 497 (Lw), 1062 (Lw). Rice Co.: R. L. McGregor 12545 (Lw). Stafford Co.: A. R. Moldenke 907 (Lw); Ungar 349 (Lw), 599 (Lw, Lw), 673 (Lw). Washington Co.: W. H. Horr 4436 (Lw), 4648 (Lw); R. L. McGregor 5025 (Lw). Woodson Co.: E. W. Lathrop 1211 (Lw). MISSOURI: Barton Co.: E. J. Palmer 54410 (Lb--50949). Bates Co.: A. R. Moldenke 891 (Lw). Benton Co.: A. R. Moldenke 862 (Lw). Boone Co.:

Daniels s.n. [Columbia, July 1903] (Lb--4193, Lb--4194, Lb--4195); Drouet 797 (Lb--12568), 846 (Lb--12183); Rickett s.n. [Centralia Rd., July 17, 1927] (Lb--7097, Lb--7098). Callaway Co.: Flaspohler 93 (Lb--51500). Grundy Co.: Crookshanks 147 (Lb--29603). Henry Co.: A. R. Moldenke 865 (Lw). Jasper Co.: Z. Williams s.n. [Jasper, Aug. 15, 1928] (Lb--4196). Lafayette Co.: Steyermark 83114 (Lb--45016). Lawrence Co.: E. J. Palmer 56661 (Lb--50950). Lincoln Co.: A. R. Moldenke 840 (Lw). Maries Co.: A. R. Moldenke 853 (Lw). Nodaway Co.: J. R. Singleton 179 (Lb--34594). Saint Louis Co.: Eggert s.n. [Aug. 15, 1877] (Lb--4192). Scotland Co.: Drouet s.n. [Sept. 7, 1931] (Lb--9465). NEBRASKA: Hall Co.: R. J. Lemaire 2284 (Lb--52671). Nemaha Co.: A. R. Moldenke 927 (Lw), 928 (Lw). Otoe Co.: A. R. Moldenke 926 (Lw). Richardson Co.: A. R. Moldenke 916 (Lw).

VERBENA HASTATA f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, *Phytologia* 9: 281--282. 1963; Steyermark., *Fl. Mo.* 1258, map 1841. 1963; Moldenke, *Résumé Suppl.* 11: 2. 1964; Moldenke, *Phytologia* 11: 341. 1965.

Steyermark (1963) records this form from Barton and Saint Louis Counties, Missouri, on the basis of specimens preserved in the herbarium of the Missouri Botanical Garden at St. Louis, not as yet seen by me.

VERBENA HASTATA f. CAERULEA Moldenke, Phytologia 10: 490. 1964.

Bibliography: Moldenke, *Phytologia* 10: 490 (1964) and 11: 201. 1964; Moldenke, *Résumé Suppl.* 11: 1. 1964.

This form differs from the typical form of the species in having pale-blue corollas.

The type of the form was collected by Andrew Ralph Moldenke (no. 1043) in a moist swale at Amherstburg, Essex County, Ontario, Canada, on August 28, 1964, and is deposited in the H. N. Moldenke Herbarium at Yonkers, New York. There were about six husky plants of this distinct color form growing among 100 of the normal form and 30 of f. rosea Cheney. Only the type specimen has been examined by me.

Citations: ONTARIO: Essex Co.: A. R. Moldenke 1043 (Z--type).

VERBENA HASTATA f. ROSEA Cheney

Additional bibliography: Steyermark., *Fl. Mo.* 1258, map 1841. 1963; Moldenke, *Phytologia* 10: 110. 1964; Moldenke, *Résumé Suppl.* 11: 1 & 2. 1964; Henry & Buker, *Trillia* 12: 125. 1964.

McGregor says of this form "scattered plants in moist ravine in bluestem prairie pasture; corolla roseate!" Steyermark (1963) records it from Livingston County, Missouri, based on a specimen preserved in the herbarium of the Missouri Botanical Garden at St. Louis, not as yet seen by me.

Additional citations: ONTARIO: Essex Co.: A. R. Moldenke 1042 (Z). IOWA: Warren Co.: A. R. Moldenke 950 (Lw). KANSAS: Franklin

Co.: R. L. McGregor 12700 (Lw, Lw).

VERBENA HASTATA var. *SCABRA* Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 110 (1964) and 11: 201. 1964; Moldenke, *Résumé Suppl.* 10: 1 (1964) and 11: 2. 1964.

Recent collectors in Kansas have found this plant in broad ravines, the margins of ponds in prairies, and in sandy loam on creek banks. Harms calls it "scattered" in sandy loam of wide low area, Wagenknecht calls it "common" in sandy soil of low ground around edges of fields, and Poindexter reports the pollen fertility as 97 percent and the chromosome number as $n=7$. Although the characters of this variety would appear to be an intensification of those seen in the "field form" of typical *V. hastata* mentioned above, the variety appears to inhabit the same wet habitats of the typical form rather than the dry pastureland habitat of the "field form".

Additional citations: WISCONSIN: Dodge Co.: A. R. Moldenke 1010 (Z). Jefferson Co.: A. R. Moldenke 1009 (Lw). KANSAS: Barber Co.: R. L. McGregor 14858 (Lw); J. D. Poindexter 201-3 (Lw). Rice Co.: V. L. Harms 903 (Lw). Scott Co.: V. L. Harms 1107 (Lw). Stafford Co.: B. L. Wagenknecht 3149 (Lw).

VERBENA HAYEKII Moldenke

Additional bibliography: Soukup, *Biota* 5: 134--135. 1964; Moldenke, *Phytologia* 10: 110 (1964) and 11: 252--256. 1965.

Soukup (1964) records the common name "cáncer ccora" for this plant.

VERBENA HIRTA Spreng.

Additional bibliography: Reitz, *Sellowia* 11: 57 & 134. 1959; Moldenke, *Phytologia* 10: 110 & 498 (1964) and 11: 239. 1965.

Additional citations: BRAZIL: Paraná: Hatschbach & Pereira 7941 [Herb. Hatschbach 10554] (Lw).

VERBENA HISPIDA Ruiz & Pav.

Additional bibliography: Kunth, *Ind. Sem. Hort. Berol.* 7. 1845; Hieron., *Bol. Acad. Nac. Córdoba* 4: 408. 1881; Hieron., *Pl. Diaph. Fl. Argent.* 214. 1882; Moldenke, *Phytologia* 10: 110, 145, 192, 210, & 296 (1964), 11: 21, 84, 86, 158, & 162 (1964), and 11: 336. 1965.

VERBENA HOOKERIANA (Covas & Schnack) Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 103 & 110--111. 1964.

VERBENA HUMIFUSA Cham.

Additional bibliography: Moldenke, *Phytologia* 10: 111, 127--129, 289, & 314. 1964.

x*VERBENA HYBRIDA* Voss

Additional synonymy: Verbena phlogiflora x coerulea Schwencke, Zytol. Untersuch. Verbenac. 15 & 27. 1931.

Additional bibliography: Schwencke, Zytol. Untersuch. Verbenac. 15 & 27. 1931; Irwin, Roadside Flow. Tex. 190. 1961; Moldenke, Résumé Suppl. 11: 4 & 8. 1964; A. & I. Nehrling, Pict Book Perenn. 131. 1964; Moldenke, Phytologia 10: 111, 311, 498, & 499 (1964), 11: 4 & 7 (1964), and 11: 265, 266, 284, & 290. 1965; Anon., Time 85 (5): 42. 1965.

Additional illustrations: A. & I. Nehrling, Pict. Book Perenn. 131. 1964.

Schwencke (1931) says "Da es sich bei V. phlogiflora x V. coerulea um einen als Gartenhybride gezüchteten Bastard handelt, ist die Ursache des Vorhandenseins der in grosser Anzahl auftretenden Zwergpollen in diesem Falle zum mindesten zweifelhaft....Die Tarpetenzellen lösen sich auf während die Pollen gefaltet sind."

It should be noted here that the name, V. hybrida Pech., is a synonym of xV. engelmannii Moldenke. The Agrelus, Hall, Lovejoy, & Maroney s.n. [8-18-18], distributed as xV. hybrida, is actually xV. perriana Moldenke.

Burpee has developed recently the "Miss Susie" variety of this hybrid with "two rows of petals".

Additional citations: HISPANIOLA: Dominican Republic: B. Augusto 1173 (N).

xVERBENA ILLICITA Moldenke

Additional bibliography: Steyerl., Fl. Mo. 1258, map 1842. 1963; Moldenke, Résumé Suppl. 10: 1 (1964) and 11: 1 & 2. 1964; Moldenke, Phytologia 10: 111 & 310 (1964), 11: 117, 196, 200, & 203 (1964), and 11: 328, 337, 338, & 342. 1965.

Poindexter reports the chromosome number of this plant as $n=7$ and the pollen fertility as 39 percent on his no. 207-19 and 42 percent on his no. 207-22. He collected the plant in waste areas near old feed lots in overgrazed pastures in Cherokee County, Kansas. Horr found it "common" in dry loam of grassland in Washington County, while Morley describes it as "scattered" in creek bottoms in Republic County of the same state.

Additional citations: ILLINOIS: Macon Co.: A. R. Moldenke 820 (Lw). Pike Co.: A. R. Moldenke 833 (Lw, Ut, Z). IOWA: Iowa Co.: A. R. Moldenke 975 (Lw, Ut, Z). Madison Co.: A. R. Moldenke (Lw). WISCONSIN: Crawford Co.: A. R. Moldenke 995 (Lw, Ut). Iowa Co.: A. R. Moldenke 1003 (Lw). KANSAS: Atchison Co.: A. R. Moldenke 910 (Lw, Ut). Cherokee Co.: J. D. Poindexter 207-19 (Lw), 207-22 (Lw). Republic Co.: G. E. Morley 806 (Lw). Washington Co.: W. H. Horr 4435 (Lw). MISSOURI: Boone Co.: Rickett s.n. [Rock Bridge, July 9, 1927] (Lb-7095). Henry Co.: A. R. Moldenke 863 (Lw, Ut). Morgan Co.: B. F. Bush 12927 (Lb-13744).

VERBENA INCISA Hook.

Additional synonymy: Verbena incisa Schau. ex R. A. Phil., Anal.

Univ. Chil. 35: 191. 1870.

Additional bibliography: R. A. Phil., Anal. Univ. Chil. 35: 191. 1870; Moldenke, Résumé Suppl. 10: 7. 1964; Moldenke, Phytologia 10: 111, 128, 133, 136, 174, 289, 496--498, & 503 (1964), 11: 7 & 138--140 (1964), and 11: 266, 271, 279, 290, 315, & 320. 1965.

xVERBENA INHONESTA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 112 (1964) and 11: 337. 1965.

VERBENA INTEGRIFOLIA Sessé & Moc.

Additional bibliography: Moldenke, Phytologia 10: 112 (1964) and 11: 158 & 162. 1964.

xVERBENA INTERCEDENS Briq.

Additional bibliography: Moldenke, Phytologia 10: 112 & 291 (1964) and 11: 86. 1964.

VERBENA INTERMEDIA Gill. & Hook.

Additional bibliography: Moldenke, Phytologia 10: 112 & 160 (1964), 11: 84 & 85 (1964), and 11: 322 & 323. 1965.

Additional citations: ARGENTINA: Corrientes: Pedersen 5435 (S, W-2432865).

xVERBENA KONDAI Moldenke

Additional bibliography: Moldenke, Phytologia 10: 112 (1964), 11: 47 (1964), and 11: 290. 1965.

VERBENA KUNTZEANA Moldenke

Additional bibliography: Moldenke, Phytologia 9: 387--388 (1963), 10: 132, 133, 175, & 499 (1964), and 11: 7. 1964.

VERBENA LACINIATA (L.) Briq.

Additional bibliography: Kunth, Ind. Sem. Hort. Berol. 7. 1845; Hieron., Bol. Acad. Nac. Córdoba 4: 409. 1881; Hieron., Pl. Diaph. Fl. Argent. 215. 1882; Muñoz Pizarro, Sin. Fl. Chil. 199--200. 1959; Sharma & Mukhopadhyay, Journ. Genet. 58: 359, 372, 377, & 384, pl. 12, fig. 53. 1963; Moldenke, Résumé Suppl. 10: 4. 1964; Moldenke, Phytologia 10: 112--113, 128, 136, 137, 146--148, 158, 186, 190, 194, 287, 294, 295, 299--301, 307, 310, & 311 (1964), 11: 7, 10, 22--25, 58, 62, 122, 123, 135, 181, 188, & 189 (1964), and 11: 245, 246, 249, 265--267, 270--273, 276, 279, 282--284, 286, 290, 291, 301, 315, 318, 320, & 321. 1965.

Additional illustrations: Sharma & Mukhopadhyay, Journ. Genet. 58: 384, pl. 12, fig. 53. 1963.

The corollas are described as "mauve" by Sharma & Mukhopadhyay (1963). Alvarez (1919) records the common name "sacha-alfa" for this plant, but indicates that it is also applied to V. tenera Spreng.

The Brücher & Brücher s.n. [Rio Pisavil, 30/1/49], cited below, was originally distributed as V. santiaguensis (Covas & Schnack)

Moldenke and was then cited by me as V. tenera Spreng. It is not conspecific with the other material gathered by these collectors and cited by me under V. cheitmaniana Moldenke.

Additional citations: ARGENTINA: Catamarca: Brücher & Brücher s.n. [Rio Pisavil, 30/1/49] (S).

VERBENA LACINIATA var. CONTRACTA (Lindl.) Moldenke

Additional bibliography: Moldenke, Phytologia 10: 113 (1964) and 11: 188 & 189. 1964.

VERBENA LACINIATA var. SABINI (Sweet) Moldenke

Additional bibliography: Moldenke, Phytologia 10: 113 (1964) and 11: 271. 1965.

VERBENA LANDBECKI R. A. Phil.

Additional bibliography: Muñoz Pizarro, Espec. Plant. Descr. Philippi 111. 1960; Moldenke, Phytologia 10: 113. 1964.

VERBENA LASIOSTACHYS Link

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1242. 1964; Moldenke, Phytologia 10: 113--114, 119, 140, 141, 186, 210, & 211 (1964), 11: 104--106, 127, 136, & 200 (1964), and 11: 241, 242, & 337. 1965.

In Shreve & Wiggins (1964) the distribution of this species is given as "In sandy or granitic soil of waste places, often in moist places along streams and canyons, mainly Upper Sonoran and Arid Transition Zones, northern Baja California to Oregon but barely entering the Sonoran Desert in eastern San Diego County, California. Introduced in New York."

VERBENA LASIOSTACHYS var. SCABRIDA Moldenke

Additional bibliography: Moldenke, Phytologia 9: 462, 466--467, & 469 (1964) and 11: 105 & 106. 1964.

VERBENA LASIOSTACHYS var. SEPTENTRIONALIS Moldenke

Additional bibliography: Moldenke, Phytologia 10: 210 & 211 (1964), 11: 105 (1964), and 11: 241. 1965.

Additional citations: CALIFORNIA: Ventura Co.: Holzwardt & Detmers s.n. [Ojai Valley, May 5, 1929] (Lb--27616).

VERBENA LILACINA Greene

Additional bibliography: Moldenke, Phytologia 9: 175--177 (1963), 9: 473--474 (1964), 10: 114 (1964), and 11: 157. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

VERBENA LINDMANII Briq.

Additional bibliography: Moldenke, Phytologia 9: 477--480 (1964) and 11: 121. 1964.

VERBENA LITORALIS H.B.K.

Additional & emended bibliography: Hieron, Bol. Acad. Nac. Cór-

doba 4: 408. 1881; Hieron, Pl. Diaph. Fl. Argent. 214. 1882; Augusto, Fl. Rio Grande do Sul 211, 214, 233, & 235, fig. 102. 1946; Muñoz Pizarro, Sin. Fl. Chil. 199. 1959; Reitz, Sellowia 13: 67 & 110. 1961; T. Mey., Op. Lillo. 10: 65 & 125. 1963; Soukup, Biota 5: 135. 1964; Moldenke, Biol. Abstr. 45: 8025. 1964; Moldenke, Phytologia 10: 114, 140, 151, 160, 182, 210, 217--219, 285, 291, 296, & 297 (1964), 11: 86, 128, 183, 186, & 188 (1964), and 11: 317, 322, & 323. 1965.

Alvarez (1919) records the common name "sange de Cristo" for this species, as he does also for V. peruviana (L.) Britton and V. bonariensis L. He writes the generic name with a lowercase initial letter. Soukup (1964) records the names "verbena" and "verbena del campo". The corolla is described as "blue" on McGregor, Harms, Robinson, R. del Rosario, & Segal 721 and on Alston 5430, and as "purple" on M. C. Carlson 3772. In Venezuela the species was collected by Alston in waste ground at 900 meters altitude; on Hawaii it was found by Carlson at 400 feet altitude. McGregor and his associates found it in an open moist meadow at 8000 feet altitude, but the specimen does not appear to be typical. In Mexico it was encountered by Breedlove on trails and on slopes with Quercus at 4800--5100 feet altitude.

Additional citations: MEXICO: Chiapas: Breedlove 6089 (Z), 6196 (Z). San Luis Potosí: McGregor, Harms, Robinson, R. del Rosario, & Segal 721 (Lw). VENEZUELA: Federal District: Alston 5430 (S, W-2440232). HAWAIIAN ISLANDS: Hawaii: M. C. Carlson 3772 (S). AUSTRALIA: New South Wales: Gray s.n. [Herb. Austral. 5377] (Lw).

VERBENA LITORALIS var. CARACASANA (H.B.K.) Briq.

Additional bibliography: Moldenke, Phytologia 10: 76--78 & 160. 1964.

VERBENA LOBATA Vell.

Additional & emended bibliography: Reitz, Sellowia 11: 57 & 134 (1959) and 13: 67 & 110. 1961; Moldenke, Phytologia 10: 79--82 (1964) and 11: 239, 243, & 245. 1965.

VERBENA LOBATA var. HIRSUTA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 82--83 & 132. 1964.

VERBENA LONGIFOLIA Mart. & Gal.

Additional bibliography: Moldenke, Phytologia 10: 83--85 & 140. 1964.

VERBENA MACDOUGALII Heller

Additional bibliography: Moldenke, Phytologia 10: 86--88, 114--118, & 307 (1964) and 11: 200 & 201. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1240. 1964; Moldenke, Résumé Suppl. 10: 7 (1964) and 11: 4. 1964; Moldenke, Biol. Abstr. 45: 8025. 1964.

Recent collectors have found this plant in the ponderosa pine forest in Arizona, while in New Mexico it has been encountered in small meadows in stands of yellow pine, with deciduous oaks, two scattered species of junipers, pinyon pine, and Pseudotsuga on the ridges, along running streams in canyons with meadows and clearings, in wet soil along streams with Abies, yellow pine, and quaking aspen, in pinyon-juniper formation and juniper-pinyon belt, in meadows and along streambanks, some in deeply shaded dells, and in association with pinyon-juniper and some oaks in primarily grassland but on reddish-brown soil. Material has been misidentified and distributed in herbaria as V. hastata L. Harms describes the plant as "numerous" in roadside clearings in ponderosa pine forests. In Shreve & Wiggins (1964) the distribution of the species is given as "In open places, mostly above the Lower Sonoran Zone, from southern Wyoming to western Texas, New Mexico, and Arizona; entering the Sonoran Desert at Mountain Park west of Tucson, Pima County, Arizona". The B. L. Wagenknecht 4809 distributed as this species is actually V. stricta Vent.

Additional citations: NEW MEXICO: Bernalillo Co.: Dunn & Gordon 45 (Lb--52464). Lincoln Co.: V. L. Harms 1802 (LW). Otero Co.: D. B. Dunn 3157 (Lb--46329), 3179 (Lb--52468), 3217 (Lb--48536). San Miguel Co.: D. B. Dunn 6703 (Lb--39457). Torrance Co.: D. B. Dunn 6138 (Lb--38146), 6215 (Lb--41536). ARIZONA: Coconino Co.: Perdue 4119 (W--2422173).

VERBENA MARITIMA Small

Additional bibliography: Menninger, Seaside Pl. 35 & 54. 1964; Moldenke, Phytologia 10: 122--126 (1964) and 11: 263. 1965.

Menninger (1964) records the common name "beach verbena".

VERBENA MARRUBIODES Cham.

Additional & emended bibliography: Reitz, Sellowia 13: 67 & 110. 1961; Moldenke, Phytologia 10: 127--129, 289, & 498 (1964) and 11: 6 & 60. 1964.

VERBENA MEGAPOTAMICA Spreng.

Additional bibliography: Moldenke, Phytologia 10: 130--135, 174, 492, 493, 496--499, & 503 (1964), 11: 6, 134, 135, & 139 (1964), and 11: 290 & 318. 1965.

VERBENA MENDOCINA R. A. Phil.

Additional bibliography: Muñoz Pizarro, Espec. Plant. Descr. Philippi 111. 1960; Moldenke, Phytologia 10: 135--138, 186, 294, 295, 301, & 313 (1964), 11: 122 (1964), and 11: 284 & 290. 1965.

VERBENA MENTHAEFOLIA Benth.

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1238. 1964; Moldenke, Phytologia 10: 99, 102, 138--145, 182, 186, 210, 212, 218, 285, 304, & 502 (1964), 11: 27 & 128 (1964), and 11: 308. 1965.

The corolla is said to have been "blue" on McGregor, Harms, Robinson, R. del Rosario, & Segal 482 and "purple" on Fearing & Thompson 60. McGregor and his associates found the plant growing in slight depressions of dry rocky open range in San Luis Potosí and as a "local colony" near a small pond in Nuevo León. Fearing & Thompson found it in red clay soil of dense oak forests. In Shreve & Wiggins (1964) its range is given as "In bottomlands, ravines, streamsides, and along roadsides, Sonoran Zones, western edge of Colorado Desert to Texas and south into northern Baja California and Oaxaca."

Additional citations: MEXICO: Hidalgo: Fearing & Thompson 60 (Lw). Nuevo León: McGregor, Harms, Robinson, R. del Rosario, & Segal 492 (Lw). San Luis Potosí: McGregor, Harms, Robinson, R. del Rosario, & Segal 523 (Lw).

xVERBENA MERETRIX Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 145 & 210. 1964.

VERBENA MICROPHYLLA H.B.K.

Additional synonymy: Lantana microphylla Mart. in Mart. & Spix, *Reise Bras.* 2: 792. 1828.

Additional bibliography: Mart. & Spix, *Reise Bras.* 2: 792. 1828; Soukup, *Biota* 5: 135. 1964; Moldenke, *Phytologia* 10: 146--150 & 190--196 (1964), 11: 51 & 53 (1964), and 11: 273, 290, & 317. 1965.

Soukup (1964) records the common names "salvia de la Virgen" and "verbenita del campo" for this species in Peru.

VERBENA MINUTIFLORA Briq.

Additional bibliography: Moldenke, *Phytologia* 10: 150--151, 159, & 160. 1964.

xVERBENA MOECHINA Moldenke

Additional bibliography: Steyerl., *Fl. Mo.* 1260, map 1843. 1963; Moldenke, *Phytologia* 10: 151--157 (1964) and 11: 117, 164, 165, 180, 190, 195, 201, & 203. 1964; Moldenke, *Résumé Suppl.* 10: 1 (1964) and 11: 2. 1964.

Demaree found this hybrid growing on dry ridges in Arkansas.

Additional citations: KANSAS: Elk Co.: A. R. Moldenke 883 (Lw, Ut). Lyon Co.: W. H. Horr s.n. [Aug. 12, 1929] (Lw). Wilson Co.: W. H. Horr s.n. [July 12, 1930] (Lw). MISSOURI: Boone Co.: Daniels s.n. [July 1903] (Lb--4167). Phelps Co.: Rickett s.n. [Yancy Mills, Aug. 13, 1927] (Lb--4170). Saint Louis Co.: Favor s.n. [June 16, 1901] (Lb--4185), s.n. [June 17, 1901] (Lb--4186). Stone Co.: B. F. Bush 15697 (Lb--23407). ARKANSAS: Lawrence Co.: Demaree 5249 (N). Randolph Co.: Demaree 29179 (Lb--47029), 30963 (Lb--46745).

VERBENA MONTEVIDENSIS Spreng.

Additional bibliography: Moldenke, Phytologia 10: 122, 151, 158--161, 173, & 499 (1964), 11: 59, 155, & 186 (1964), and 11: 322 & 323. 1965.

Additional citations: BRAZIL: Paraná Hatschbach & Pereira 7827 [Herb. Hatschbach 10442] (Lw). ARGENTINA: Corrientes: Pedersen 5074 (W--2432703, W--2432708).

VERBENA MORICOLOR Moldenke

Additional bibliography: Moldenke, Phytologia 10: 133 & 173--174 (1964) and 11: 139. 1964.

VERBENA MULTICAULIS Raf.

Additional bibliography: Moldenke, Phytologia 10: 174 (1964) and 11: 180. 1964.

VERBENA NANA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 175--176 (1964) and 11: 139. 1964.

VERBENA NEOMEXICANA (A. Gray) Small

Additional bibliography: Moldenke, Phytologia 10: 99, 140, 176--189, 192, 193, 210, 218, 285, 296, 303, 304, 306, & 502 (1964), 11: 13--15, 18, & 111 (1964), and 11: 315, 316, & 337. 1965.

VERBENA NEOMEXICANA var. HIRTELLA Perry

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1241. 1964; Moldenke, Phytologia 10: 140, 180--184, 186, 218, 285, 304, & 306 (1964), 11: 13 & 14 (1964), and 11: 341. 1965.

In Shreve & Wiggins (1964) the distribution of this variety is given as "In dry arroyos, plains and rocky hillsides, often in shaded situations, Lower Sonoran to Arid Transition Zones, Gila County, Arizona, to Texas, Nuevo León, and at least to vicinity of El Marmol, Baja California."

VERBENA NEOMEXICANA var. XYLOPODA Perry

Additional bibliography: Moldenke, Phytologia 10: 140, 182--189, 218, 285, 306, & 502 (1964) and 11: 111. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1241. 1964.

In Shreve & Wiggins (1964) the distribution of this variety is given as "In sandy soil on hillsides, mountain valleys, dry plains, open, dry rocky slopes, and along moist streamsides, Lower Sonoran to Arid Transition Zones, southern California to Texas, San Luis Potosí, and northern Baja California. Introduced in Florida."

xVERBENA NEQUAM Moldenke

Additional bibliography: Moldenke, Phytologia 10: 186 (1964) and 11: 290. 1965.

xVERBENA NISA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 189--190 & 301

(1964) and 11: 290. 1965.

VERBENA NIVEA Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 147, 148, & 190--192. 1964.

VERBENA NIVEA f. ROSEA Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 147 & 191--192. 1964.

xVERBENA NOTHA Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 178 & 192--193. 1964.

VERBENA OCCULTA Moldenke

Additional bibliography: Soukup, *Biota* 5: 135. 1964; Moldenke, *Phytologia* 10: 193--194. 1964.

Soukup (1964) records the common name "verbenita del campo" for this species. Saunders describes the flowers as "deepish mauve....outer surface of petals mauvish-white" on his no. 961 and "as for 961 but with considerably lighter flowers" on his no. 962. He describes the leaves as "dark green, shiny on upper surface, lighter green with fine white hairs beneath."

Additional citations: PERU: La Libertad: López & Sagastegui 2718 (W--2430832); G. E. Saunders 961 (Z), 962 (Z).

VERBENA OFFICINALIS L.

Additional synonymy: Verbena aubrietii Kern., in herb.

Additional & emended bibliography: Charany, *Journ. de Chim.*, ser. 7, 2: 292--298. 1910; *Lond. Chem. Soc. Journ.* 98: 991. 1910; *Chem. Abstr.* 5: 2525. 1911; Schnarf, *Ost. Bot. Zeitschr.* 74: 41 & 45. 1925; Schnarf in Linsb., *Handb. Pflanzenanat.* 10 (2): 233, 345, & 380. 1929; Schwencke, *Zytol. Untersuch. Verbenac.* 6--10, 19, 21--23, 31, & 33--34, fig. 1--4 & 16--26. 1931; Patermann, *Beitr. Zytol. Verbenac.* 8, 10, 43, & 47. 1935; Bider, *Beitr. Pharmakog. Borag.* 95--98, pl. 7, fig. 1. 1935; Oppenheimer & Evenari, *Bull. Soc. Bot. Genev.* 31: 363. 1941; Oppenheimer & Evenari, *Florul. Cisiord.* 363. 1948; M. L. Buch, *U. S. Dept. Agr. Agric. Handb.* 64: 13. 1960; Irwin, *Roadside Flow. Tex.* 190. 1961; Hatusima, *Mem. South. Indust. Sci. Inst. Kagoshima Univ.* 3 (1): 31. 1962; Moldenke, *Résumé Suppl.* 11: 5 & 8. 1964; Moldenke, *Phytologia* 10: 138, 140--142, 145, 176--178, 182, 186, 194--236, 271--282, 285, 307, 311, & 502 (1964), 11: 55, 86, 102, 103, 111, 113, 117, 128, 164, 200, & 203 (1964), and 11: 241, 242, 256, 257, 273, 290, 304, 310, 336, 340, & 341. 1965.

Additional illustrations: Schnarf, *Ost. Bot. Zeitschr.* 74: 41. 1925; Schwencke, *Zytol. Untersuch. Verbenac.* fig. 1--3 & 16--26. 1961; Bider, *Beitr. Pharmakog. Borag.* 97, pl. 7, fig. 1. 1935.

Charany (1910) and Buch (1960) report the presence of chlorogenic acid in the leaves of this species. Both Schwencke (1931) and Patermann (1935) report the haploid chromosome number of this

species as $n=6$. Reitz (1959) reports the species as cultivated in Brazil. Hatusima (1962) records it from the Amami Islands.

The W. H. Duncan 20214, Seymour & Earle 109, and J. Skehan s. n. [Ocean Springs, 1892], distributed as V. officinalis, are all V. halei Small; Gordon & Dunn 878 is V. perennis Wooton; and Crookshanks 142 is xV. perriana Moldenke.

VERBENA OFFICINALIS var. ALBIFLORA Strobl

Additional bibliography: Moldenke, Phytologia 10: 212 & 277--278. 1964.

VERBENA OFFICINALIS var. GAUDICHAUDII Briq.

Additional bibliography: Moldenke, Phytologia 10: 217 & 279--280. 1964.

VERBENA OFFICINALIS var. GRANDIFLORA Hausskn.

Additional bibliography: Moldenke, Phytologia 10: 217 & 280. 1964.

VERBENA OFFICINALIS var. MACROSTACHYA (F. Muell.) Benth.

Additional bibliography: Moldenke, Phytologia 10: 212 & 280--281. 1964.

VERBENA OFFICINALIS var. PROSTRATA Gren. & Godr.

Additional bibliography: Moldenke, Phytologia 10: 217, 218, 229, & 281--282 (1964) and 11: 257. 1965.

VERBENA ORCUTTIANA Perry

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1240. 1964; Moldenke, Phytologia 10: 182, 218, & 284--286 (1964) and 11: 128. 1964.

In Shreve & Wiggins (1964) the distribution of this species is given as "On tablelands and mountains, dry flats, and the margins of dry pools, Sonoran Zones, northeastern Baja California."

VERBENA ORIGENES R. A. Phil.

Additional synonymy: Verbena origins R. A. Phil., Anal. Mus. Nac. Bot. 2: 58. 1891.

Additional bibliography: R. A. Phil., Anal. Mus. Nac. Bot. 2: 58. 1891; Muñoz Pizarro, Sin. Fl. Chil. 199 & 200. 1959; Muñoz Pizarro, Espec. Plant. Descr. Philippi 110 & 111. 1960; Moldenke, Phytologia 10: 286--288. 1964; Moldenke, Résumé Suppl. 11: 8. 1964.

According to Muñoz Pizarro (1960) the type of V. origenes was "encontró en los más altos Andes de Coquimbo, en la cerro del Toro. Herb. Chil. no. 1906" by Gay, while that of V. origins was "Colec-tada en la quebrada de Paipote, Atacama." It seems to me that the names are just accidental orthographic variants of each other.

xVERBENA OSTENI Moldenke

Additional bibliography: Phytologia 10: 288--289 (1964) and 11: 7. 1964.

VERBENA PARAGUARIENSIS Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 292 & 504. 1964.

VERBENA PARODII (Covas & Schnack) Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 293--295 & 313 (1964) and 11: 123. 1964.

VERBENA PAULSENI R. A. Phil.

Additional bibliography: Mufloz Pizarro, *Espec. Plant. Descr. Philippi* 111. 1960; Moldenke, *Phytologia* 10: 298--299. 1964.

VERBENA PERAKII (Covas & Schnack) Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 189--190, 295, & 299--301 (1964), 11: 122 (1964), and 11: 280 & 290. 1965.

VERBENA PERENNIS Wooton

Additional bibliography: Moldenke, *Phytologia* 10: 183 & 301--306 (1964) and 11: 13. 1964.

Gordon & Norris found this species in "occasional oak, pinyon pine and juniper, mostly grassland cultivated" in Otero County, New Mexico, while Gordon & Dunn found it "in canyon with black walnuts along creek bed, sparse juniper on hillsides, poor grassland in open places" in Lincoln County. Material has been misidentified and distributed in herbaria as *V. officinalis* L.

Additional citations: NEW MEXICO: Lincoln Co.: Gordon & Dunn 878 (Lb--40886). Otero Co.: Gordon & Norris 549 (Lb--54095).

xVERBENA PERRIANA Moldenke

Additional bibliography: Steyer., *Fl. Mo.* 1261. 1963; Moldenke, *Résumé Suppl.* 11: 1 & 2. 1964; Moldenke, *Phytologia* 10: 210, 218, & 307--313 (1964), 11: 117 & 202 (1964), and 11: 336. 1965.

Steyermark (1963) says "A specimen from Grundy County (pastures, July 28, 1937, D. R. Crookshanks 142, in *U. Mo. Herb.*) appears to be a hybrid between *V. bracteata* and *V. hastata*." I have examined this specimen, originally identified as *V. officinalis* L., and find it to be x*V. perriana*.

Additional citations: IOWA: Mills Co.: A. R. Moldenke 918 (Lw). Pottawatomie Co.: A. R. Moldenke 932 (Lw). MISSOURI: Grundy Co.: Crookshanks 142 (Lb--29613).

xVERBENA PERTURBATA Moldenke

Additional bibliography: Moldenke, *Phytologia* 10: 295 & 313. 1964.

VERBENA PERUVIANA (L.) Britton

Additional bibliography: Soukup, *Biota* 5: 135. 1964; Moldenke, *Phytologia* 10: 175, 288, 289, 301, 313, 319, 490, 491, 496--498, & 504 (1964), 11: 3, 6, 7, 9, 24, 25, 86, 134, 135, 139, 140, & 181 (1964), and 11: 272, 273, 280, 290, 320, & 321. 1965.

Soukup (1964) records the common name "melindres colorado" and "pampas" for this plant.

VERBENA PHLOGIFLORA Cham.

Additional bibliography: Moldenke, Résumé Suppl. 11: 8. 1964; Moldenke, Phytologia 10: 492--501 (1964), 11: 27, 86, 138, & 140 (1964), and 11: 290. 1965.

VERBENA PHLOGIFLORA f. ALBA Moldenke

Additional bibliography: Moldenke, Biol. Abstr. 27: 2026. 1953; Moldenke, Phytologia 10: 501. 1964.

VERBENA PINETORUM Moldenke

Additional bibliography: Moldenke, Phytologia 10: 501--503. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 516 & 1010. 1964.

VERBENA PINNATILOBA (Kuntze) Moldenke

Additional bibliography: Moldenke, Phytologia 10: 498 & 503. 1964.

VERBENA PLATENSIS Spreng.

Additional bibliography: Spector, Handb. Biolog. Data 186. 1956; Moldenke, Phytologia 10: 503--504 (1964) and 11: 1--11, 24, 25, & 86. 1964.

Spector (1956) reports on the temperature effect on the life span of seeds of this species stored in sealed containers. With a moisture content of 6 percent, the median life span is 3 years and the maximum life span is 6 years at 24° C. At 5° C. the median life span is 9 years and the maximum life span is 13 years; while at minus 4° C. the median and maximum life span is 15 years.

VERBENA PLATENSIS f. VIOLACEA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 6 & 10--11. 1964.

VERBENA PLICATA Greene

Additional bibliography: Moldenke, Résumé Suppl. 11: 3. 1964; Moldenke, Phytologia 11: 11--18, fig. 13. 1964.

VERBENA PLICATA var. DEGENERI Moldenke

Additional bibliography: Moldenke, Phytologia 11: 13, 14, & 18--19. 1964.

VERBENA PORRIGENS R. A. Phil.

Additional bibliography: Moldenke, Phytologia 11: 20--21 (1964) and 11: 245 & 246. 1965.

VERBENA PULCHELLA Sweet

Additional bibliography: Moldenke, Phytologia 11: 21--26 & 46 (1964) and 11: 269--271, 273, 277, 278, & 290. 1965.

VERBENA PULCHRA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 26--28 & 139. 1964.

VERBENA PUMILA Rydb.

Additional bibliography: Moldenke, Résumé Suppl. 11: 3. 1964; Moldenke, Phytologia 11: 28--41, 43, 44, 48, 100, & 158, fig. 14 (1964) and 11: 283, 290, 308, & 326. 1965.

VERBENA PUMILA f. ALBIDA Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.7: 455. 1964; Moldenke, Phytologia 9: 188 (1963) and 11: 32, 39--41, & 43. 1964.

VERBENA QUADRANGULATA Heller

Additional bibliography: Moldenke, Résumé Suppl. 11: 8. 1964; Moldenke, Phytologia 11: 30, 32, 33, 39--46, & 48. 1964.

The "Verbena quadrangulata" cited by me as having been published in synonymy in my Résumé Suppl. 11, page 7, was actually published on page 8 of that work.

VERBENA RACEMOSA Eggert

Additional bibliography: Moldenke, Phytologia 11: 21, 23, 32, 43, & 46--50 (1964) and 11: 290. 1965.

VERBENA RADICATA Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.7: 454. 1964; Moldenke, Phytologia 11: 50--52 (1964) and 11: 249, 252, 273, & 317. 1965.

VERBENA RADICATA var. GLABRA (Hicken) Moldenke

Additional bibliography: Moldenke, Phytologia 11: 52. 1964; Hocking, Excerpt. Bot. A.7: 454. 1964.

VERBENA RECTA H.B.K.

Additional bibliography: Moldenke, Phytologia 11: 54--56 (1964) and 11: 327. 1965.

VERBENA REICHII Acevedo de Vargas

Additional bibliography: Acevedo de Vargas, Rev. Chil. Hist. Nat. 54: 45. 1954; Moldenke, Phytologia 11: 57--58. 1964.

I am grateful to my friend, Benkt Sparre, for calling my attention to the fact that Acevedo de Vargas (1953) has emended her original discussion of this species by stating that Reiche collected the type in the Cordillera de Santiago at 2500 meters altitude in January, 1892.

VERBENA RIBIFOLIA var. FOETIDA (R. A. Phil.) Acevedo de Vargas

Additional bibliography: Moldenke, Phytologia 11: 60 & 61. 1964.

VERBENA RIGIDA Spreng.

Additional bibliography: Moldenke, Phytologia 10: 499 (1964), 11:

62--68, 80--99, 127, 158, 162, & 190, fig. 15 (1964), and 11: 266, 322, & 323. 1965.

VERBENA RIGIDA var. LILACINA (Benary & Bodger) Moldenke

Additional bibliography: Moldenke, Phytologia 11: 81 & 96--97. 1964.

VERBENA RIGIDA var. OBOVATA (Hayek) Moldenke

Additional bibliography: Moldenke, Phytologia 11: 87 & 97--98. 1964.

VERBENA RIGIDA var. REINECKII (Briq.) Moldenke

Additional bibliography: Moldenke, Phytologia 11: 84--86 & 98--99. 1964.

VERBENA RINCONENSIS Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.7: 454. 1964; Moldenke, Phytologia 11: 99--100. 1964.

VERBENA RIPARIA Raf.

Additional bibliography: Moldenke, Phytologia 11: 100--103 (1964) and 11: 336. 1965.

VERBENA ROBUSTA Greene

Additional bibliography: Moldenke, Phytologia 11: 103--108 & 201. 1964.

VERBENA RUGOSA Mill.

Additional bibliography: Moldenke, Phytologia 11: 108--109, 158, & 190. 1964.

VERBENA RUSSELLII Moldenke

Additional bibliography: Langman, Select. Guide Lit. Flow. Pl. Mex. 516 & 1010. 1964; Moldenke, Phytologia 11: 112--113. 1964.

xVERBENA RYDBERGII Moldenke

Additional bibliography: Moldenke, Phytologia 11: 113--120, 190, 195, 196, & 200--203. 1964.

VERBENA SANTIAGUENSIS (Covas & Schnack) Moldenke

Additional bibliography: Moldenke, Phytologia 11: 121--123 & 135 (1964) and 11: 273 & 290. 1965.

VERBENA SCABRA Vahl

Additional bibliography: Moldenke, Phytologia 11: 84, 86, 102, & 123--133 (1964) and 11: 336, 342, 344, & 346. 1965.

VERBENA SESSILIS (Cham.) Kuntze

Additional bibliography: Moldenke, Phytologia 11: 141--142, 155--156, 185, & 186. 1964.

VERBENA SHREVEI Moldenke

Additional bibliography: Langman, Select. Guide Lit. Flow. Pl. Mex. 516. 1964; Moldenke, Phytologia 11: 157--158. 1964.

VERBENA SIMPLEX Lehm.

Additional bibliography: Moldenke, Phytologia 11: 158--181, 190, & 201--203, fig. 16 (1964) and 11: 328, 340, & 341. 1965.

VERBENA SIMPLEX f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 164 & 179--180. 1964.

VERBENA SIMPLEX var. EGGERTI Moldenke

Additional bibliography: Moldenke, Phytologia 11: 164, 165, & 180--181. 1964.

xVERBENA SOLBRIGII Moldenke

Additional bibliography: Moldenke, Phytologia 11: 181 (1964) and 11: 290. 1965.

VERBENA STELLARIOIDES Cham.

Additional bibliography: Moldenke, Phytologia 11: 155 & 184--187 (1964) and 11: 322--324. 1965.

VERBENA STRICTA Vent.

Additional bibliography: Moldenke, Phytologia 11: 158, 162--164, & 190--213, fig. 17 (1964) and 11: 219--238, 328, 337, 339, 341, & 342. 1965.

VERBENA STRICTA f. ALBIFLORA Wadmond

Additional bibliography: Moldenke, Phytologia 11: 200--203 (1964) and 11: 232--237. 1965.

VERBENA STRICTA f. ROSEIFLORA Benke

Additional bibliography: Moldenke, Phytologia 11: 201--203 (1964) and 11: 235--238. 1965.

VERBENA SULPHUREA D. Don

Additional bibliography: Moldenke, Phytologia 11: 242--251 & 290. 1965.

VERBENA SULPHUREA f. ALBA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 246--248. 1965.

VERBENA SULPHUREA var. CANESCENS R. A. Phil.

Additional bibliography: Moldenke, Phytologia 11: 246 & 248. 1965.

VERBENA SULPHUREA f. FUSCORUBRA Skottsberg

Additional bibliography: Moldenke, Phytologia 11: 246 & 248--249. 1965.

VERBENA SULPHUREA var. TALTALENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 11: 246 & 251. 1965.

VERBENA SUPINA f. ERECTA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 257 & 259--260. 1965.

VERBENA TAMPENSIS Nash

Additional bibliography: Moldenke, Phytologia 11: 262--264 & 290. 1965.

xVERBENA TEASII Moldenke

Additional bibliography: Moldenke, Phytologia 11: 264--267, 284, & 290. 1965.

VERBENA TENERA Spreng.

Additional bibliography: Moldenke, Phytologia 11: 267--280, 284, 290, 291, 302, 312, & 320. 1965.

VERBENA TENERA var. MAONETTI Regel

Additional bibliography: Moldenke, Phytologia 11: 272, 273, 276--280, 290, & 321. 1965.

VERBENA TENUISECTA Briq.

Additional bibliography: Moldenke, Phytologia 11: 290--304, 318, 320, & 321, fig. 18. 1965.

VERBENA TENUISECTA var. ALBA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 291 & 301--303. 1965.

VERBENA TEUCRIIFOLIA var. COROLLULATA Perry

Additional bibliography: Moldenke, Phytologia 11: 308 & 310--311. 1965.

xVERBENA TORPA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 315--316 & 337. 1965.

xVERBENA TRANSITORIA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 290 & 318. 1965.

xVERBENA TRINITENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 11: 290 & 320--321. 1965.

VERBENA VALERIANOIDES H.B.K.

It should be noted here that the Verbena valerianoides of Saint-Hilaire is a synonym of V. ephedroides Cham.

In all, 14 herbarium specimens and 2 mounted phototypes of this species have been examined by me.

Citations: COLOMBIA: Boyacá: Barclay & Juajibioy 7632 (N); Langenheim 3367 (Ca--78027). Cundinamarca: Apolinaire-Marie 706 (Mg--50); Hartweg 1350 (Br, Lu, N); Holton 507 (T); Humboldt & Bonpland s.n. [Macbride photos 39476] (Kr--photo of type, N--photo of type); F. W. Pennell 2329 (N, W--1042255), 2475 (N, W--1042312); M. Schneider 437 (S); Triana 2052 (Bm). Narino: Triana s.n. [Pasto, 1853] (Bm).

VERBENA VARIABILIS Moldenke, Bot. Gaz. 106: 164. 1944.

Bibliography: Moldenke, Bot. Gaz. 106: 162 & 164. 1944; Moldenke, Alph. List Cit. 3: 728 (1949) and 4: 1078. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 74 & 200. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 85 & 474. 1959.

Perennial herb, 0.5--1 m. tall; stems tough, subterete or slightly tetragonal, lightly puberulent-strigillose, glabrescent toward the base, stramineous; branches short, very slender, more or less puberulent-strigillose; principal internodes 3--5 cm. long; leaves sessile, decussate-opposite or approximate, rather uniformly green on both surfaces, 2--3 cm. long, 1--2 cm. wide, the lower ones and those on the stems in general 3-parted with broad segments, each segment entire or with 1--3 large lobes, those on the branches 3-parted with very narrow, linear, pinnatisect segments, the lobes blunt at the apex, all strigillose on both surfaces, revolute along the margins; peduncles slender, 2.5--9.5 cm. long, more or less strigillose-puberulent, especially toward the apex, usually with 1 or 2 pairs of much reduced tripartite bracts near the apex and at the midpoint; spikes 2--5 cm. long, densely many-flowered; rachis densely spreading-puberulent; bractlets lanceolate, about 5 mm. long, long-acuminate at the apex, densely glandular-puberulent with erect spreading hairs; calyx about as long as the subtending bractlet, thin-textured, lightly glandular-puberulent; corolla light-purple, white within, reddish-pink at the base, its tube somewhat exerted from the calyx.

The type of this species was collected by R. D. Metcalf (no. 30255) in moist clay soil in good open drainage near Córdova, at an altitude of 3050 to 3300 meters, in the province of Castrovirreina, Huancavelica, Peru, on March 27 or 28, 1942, and is deposited in the United States National Herbarium at Washington. The roots are used by the local Amerinds against fleas.

The species is known to me thus far only from the type collection. In all, 2 herbarium specimens, including the type, and one mounted photograph have been examined by me.

Citations: PERU: Huancavelica: R. D. Metcalf 30255 (Ca--694968--isotype, N--photo of type, W--1834978--type).

VERBENA VENTURII Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 79. 1942.

Bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 44, 79, & 102. 1942; Moldenke, Castanea 13: 119. 1948; Moldenke, Alph. List Cit. 2: 375 (1948) and 4: 1088, 1091, 1092, & 1293. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 107 & 200. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 128 & 474. 1959; Moldenke, Résumé Suppl. 6: 7. 1963; Moldenke, Phytologia 9: 397. 1964.

Herb; stems ascending, herbaceous, tetragonal, rather densely hirsute with spreading white hairs of various lengths; nodes not annulate; principal internodes 1.5--3 cm. long; leaves decussate-opposite, often with fascicles of smaller ones on abbreviated twigs in their axils; petioles 5--10 mm. long, spreading-hirsute like the branches, alate-margined; leaf-blades membranous, uniformly green on both surfaces, ovate in outline, 1.5--3 cm. long, 1--2.5 cm. wide, deeply 3-parted, the divisions each again incised and many-lobed with obtuse or subacute lobes, densely spreading-hirsute with white stiff hairs on both surfaces; midrib and secondaries flat above, prominulous beneath; inflorescence terminal; peduncles 4.5--6 cm. long, spreading-hirsute with stiff white hairs like the stems; spikes densely many-flowered, 3--3.5 cm. long and wide in anthesis (including the corollas); bractlets lanceolate, about 3 mm. long and 1 mm. wide, sharply acute at the apex, the margins long-ciliate with stiff white antrorse hairs; calyx narrow-tubular, 6--7 mm. long, about 1 mm. wide, densely spreading-pubescent or hirsutulous, its rim very shortly and obscurely toothed; corolla hypocrateriform, violet or rose-lilac, its tube 10--13 mm. long, glabrous on the outside, the limb 6--9 mm. wide.

The type of this species was collected by Santiago Venturi (no. 949) -- in whose honor it is named -- on islands in and on the sandy banks of the river at Duraznilo, at an altitude of 600 meters, on the Río Sali, dept. Capital, Tucumán, Argentina, on September 3, 1920, and is deposited in the Britton Herbarium at the New York Botanical Garden. The species has also been collected in sandy soil, on campos, and on sandy campos, at altitudes from 450 to 900 meters, blooming in January, March, July, September, and December. Material has been misidentified and distributed in herbaria under the name V. erinoides Lam.

In all, 18 herbarium specimens, including the type, and 4 mounted photographs have been examined by me.

Citations: ARGENTINA: Córdoba: E. Fielding s.n. [Cordova] (Bm). Jujuy: R. E. Fries 296 (N, S, S). La Rioja: Venturi 7840 [Herb. Osten 20863] (Du--372482, Gg--166779, Ug, W--1443307, W--1591393). Salta: Schreiter 9472 [Herb. Osten 22898] (Ug); Venturi 3677 (W--1591278), 10301 (Bm, N, S). Tucumán: Venturi 949 [Herb. Osten 17243; Herb. Inst. Miguel Lillo 31731] (F--photo of type, N--type, N--photo of type, Si--photo of type, Ug--isotype, W--1591235--isotype, Z--photo of type), 2441 [Herb. Osten 17256] (Ug).

VERBENA VILLIFOLIA Hayek in Engl., Bot. Jahrb. 42: 164--165. 1908.

Bibliography: Hayek in Engl., Bot. Jahrb. 42: 164--165. 1908;

Prain, Ind. Kew. Suppl. 4: 245. 1913; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 35 & 102 (1942) and [ed. 2], 74 & 200. 1949; Moldenke, Alph. List Cit. 3: 688 (1949) and 4: 1112 & 1167. 1949; Moldenke, Inform. Mold. Set 51 Spec. 4. 1956; Moldenke, Résumé 85 & 474. 1959; Moldenke, Résumé Suppl. 6: 6. 1963; Moldenke, Phytologia 9: 296 (1963) and 10: 103 & 110. 1964.

Small shrublet; branches prostrate, the youngest parts densely villous; leaves decussate-opposite, cuneately trifid, gradually attenuate into a short petiole at the base, appressed-villous on both surfaces, the middle lobe cuneate and 3-lobulate at the apex, the lateral lobes 2-lobulate; midrib and secondaries prominent beneath; spikes terminal, subsessile, dense, few-flowered, at first fastigiate, later becoming shortly cylindric, the rachis villous; bractlets ovate-lanceolate, longer than the calyx, acute at the apex, villous; calyx about 4 mm. long, appressed-pilose, 5-dentate, accrescent in fruit; corolla rose or lilac to violet or even whitish, only slightly longer than the calyx; upper anthers not appendaged; cocci testaceous, about 3 mm. long, scrobiculate-rugose.

The type of this diminutive species was collected by August Weberbauer (no. 2582) along a roadside at about 3900 meters altitude at La Oroya, Junín, Peru, and was deposited in the herbarium of the Botanisches Museum at Berlin, now destroyed, but where it was fortunately photographed by Macbride as his type photograph no. 17458. Hayek (1908) says of it: "Ein kleines Spalierstrauchlein aus der nächsten Verwandtschaft der *V. inflata* Kth., im Habitus aber der *V. microphylla* sehr ähnlich, aber durch die dichte Behaarung und den Mangel eines Konnektivanhängsels leicht zu unterscheiden. Von *V. inflata*, der sie sich in der Ausbildung des Kelches am meisten nähert, ist sie durch den Wachs, die viel weniger tief geteilten Blätter und die dichte Behaarung verschieden. Sehr nahe scheint sie auch der mir unbekannten *V. pogonostoma* Walp. zu stehen, doch hat letztere nach der Beschreibung schmalere, fiederspaltige Blattabschnitte und sich nach dem Verblühen stark verlängernde Inflorescenzen."

Verbena villifolia inhabits grassy steppes at altitudes of 10,000 to 13,000 feet, and has been collected in anthesis in March, April, September, and November, in fruit in September. Material has been misidentified and distributed in herbaria as *V. cuneifolia* Ruiz & Pav. and as *V. hispida* Ruiz & Pav. The Asher, Kates, & Cia. 18003, cited below, is referred here only doubtfully.

In all, 9 herbarium specimens and 2 mounted photographs of the type collection have been examined by me.

Citations: PERU: Ancash: Cerrate 2567 (Ok). Cuzco: Rose & Rose 19072 (W--761654). Huancavelica: Tovar 743 (Z), 1194 (Ss). Junín: A. S. Kalenborn 22a (W--1044270); Kunkel 372 (Gg); F. L. Stevens 7 (W--1199960); Weberbauer 2582 [Macbride photos 17458] (Kr--photo of type, N--photo of type). Department undetermined: Asher, Kates, & Cia. 18003 (Kr); Collector undesignated s.n. (N).

VERBENA WEBERBAUERI Hayek in Engl., Bot. Jahrb. 42: 163. 1908.

Bibliography: Hayek in Engl., Bot. Jahrb. 42: 163. 1908; Prain, Ind. Kew. Suppl. 4: 245. 1913; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 35 & 102. 1942; Moldenke, Castanea 13: 116 & 117. 1948; H. N. & A. L. Moldenke, Pl. Life 2: 43 & 44. 1948; Moldenke, Alph. List Cit. 3: 688 (1949) and 4: 1112 & 1191. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 74, 98, & 200. 1949; Soukup, Biota 1: 181. 1956; Moldenke, Résumé 85, 115, & 474. 1959; Moldenke, Résumé Suppl. 8: 2. 1964; Moldenke, Phytologia 10: 148. 1964.

Very small shrublet; roots woody; stems appressed to the ground, 5--10 cm. long, simple or branched; leaves decussate-opposite; leaf-blades ovate, small, 10--15 mm. long, obtuse at the apex, incised-crenate-serrate along the margins, covered with strong appressed setae on both surfaces; spikes cylindric, 2--3 cm. long, dense; bractlets ovate-lanceolate, shorter than the calyx, acute at the apex, setose-hispid; calyx ovate, 2--3 mm. long, shortly 5-toothed; corolla small, lilac or bluish-white, 3--4 mm. long, setose-puberulent on the outside.

The type of this tiny species was collected by August Weberbauer (no. 440) -- in whose honor it is named -- in open mats at 3700 meters altitude at Pucará, a station on the Puno--Cuzco railroad, and was deposited in the herbarium of the Botanisches Museum at Berlin, where it was fortunately photographed by Macbride as his type photograph no. 17459, but is now destroyed. Hayek (1908) says: "Ein kleines Spaliersträuchlein, in Blütengrösse, und Blattgestalt mit vorige [V. parvula Hayek] ziemlich übereinstimmend, aber durch die Wuchsform, das dichtere Indument und die dichten Ähren leicht zu unterscheiden."

The species has been found on dry cliffs, at 3700 meters altitude, flowering in March. Material has been misidentified and distributed in herbaria as V. microphylla H.B.K.

In all, 2 herbarium specimens and 2 mounted phototypes have been examined by me.

Citations: PERU: Puno: Weberbauer 440 [Macbride photos 17459] (Kr--photo of type, N--photo of type). BOLIVIA: La Paz: Buchtien 1102 (N, S).

xVERBENA WINGEI Moldenke, Bot. Gaz. 106: 164. 1944.

Synonymy: Verbena tenera x aubletia Winge, Proc. Linn. Soc. Lond. 150: 236. 1938. Verbena aubletia Jacq. x V. tenera Spreng. ex Moldenke, Résumé 358, in syn. 1959. Verbena canadensis (L.) Britton x V. tenuisecta Briq. ex Moldenke, Résumé 360, in syn. 1959. Verbena tenuisecta Briq. x V. canadensis (L.) Britton ex Moldenke, Résumé 376, in syn. 1959.

Bibliography: Winge, Proc. Linn. Soc. Lond. 150: 235. 1938; S. A. Cain, Found. Pl. Geogr. 335. 1944; Moldenke, Bot. Gaz. 106: 164. 1944; Moldenke, Alph. List Invalid Names Suppl. 1: 27. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 165 & 200. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Am. Midl.

Nat. 59: 363. 1958; Moldenke, *Résumé* 225, 358, 360, 376, & 474. 1959; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2213. 1961; Moldenke, *Phytologia* 8: 121 (1961), 8: 435, 437, & 440 (1962), and 11: 271 & 290. 1965.

This is the hybrid between *V. canadensis* (L.) Britton and *V. tenuisecta* Briq., produced artificially by Winge in England in 1938. Its characters are intermediate between those of the two parental species. Cain (1944) points out that Winge was able to segregate both parental species from the offspring of this hybrid because the series of characters separating them are apparently linked in the chromosomes. The two parental species are often grown together in gardens and are found wild together in at least 2 parishes of Louisiana, 12 counties of Texas, and one county each in Alabama and Florida. *Verbena tenuisecta* is spreading rapidly in the southern United States; already it is wild in 5 counties of Alabama, 4 of Mississippi, 16 of Florida, 28 of Georgia, and 16 of Texas. *Verbena canadensis* is native in all of these states, so the hybrid is to be expected throughout the area.

VERBENA WRIGHTII A. Gray, *Syn. Fl. N. Am.* 2 (1): 337—338. 1878.

Synonymy: *Verbena pinnatifida* M. E. Jones ex Moldenke, *Suppl. List Invalid Names* 10, in syn. 1941 [not *V. pinnatifida* Lam., 1791, nor Nutt., 1941, nor Schau., 1895]. *Verbena aubletia* var. *bipinnatifida* Fendler ex Moldenke, *Résumé Suppl.* 3: 36, in syn. 1962. *Verbena bipinnatifida* var. *latifolia* Perry ex Moldenke, *Résumé Suppl.* 3: 36, in syn. 1962 [not *V. bipinnatifida* var. *latifolia* Scholl, 1960].

Bibliography: A. Gray, *Syn. Fl. N. Am.* 2 (1): 337. 1878; S. Wats., *Proc. Am. Acad. Sci.* 18: 136. 1883; Coult., *Contrib. U. S. Nat. Herb.* 2: 328. 1892; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.* 4 (3a): 148. 1894; Jacks. in Hook. f. & Jacks., *Ind. Kew.* 2: 1180. 1895; Eggert, *Torreya* 2: 123. 1902; Shreve, *Carnegie Inst. Wash. Publ.* 217: 44. 1915; Perry, *Ann. Mo. Bot. Gard.* 20: 248, 312, 327—329, 331, & 356, pl. 13. 1933; Junell, *Symb. Bot. Upsal.* 4: 11 & 14. 1934; Cory, *Texas Agr. Exp. Sta. Bull.* 550: 89. 1937; Moldenke, *Cult. Pl.* 35. 1938; O. E. Sperry, *Sul Ross State Teach. Coll. Bull.* 19: 68. 1938; Moldenke, *Annot. & Classif. List* 109. 1939; Moldenke, *Prelim. List Invalid Names* 47. 1940; Wyman & Harris, *Navajo Ind. Ethno-Bot.* 45 & 47. 1941; Moldenke, *Suppl. List Invalid Names* 10. 1941; O. E. Sperry, *Sul Ross State Teach. Coll. Bull.* 22: 41. 1941; Worsdell, *Ind. Lond. Suppl.* 2: 487. 1941; Moldenke, *Alph. List Invalid Names* 49. 1942; Moldenke in Lundell, *Fl. Texas* 3 (1): 19 & 42—43. 1942; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 1], 11—15, 19, 74, & 102. 1942; Little & Campbell, *Am. Midl. Nat.* 30: 664. 1943; Moldenke, *Castanea* 10: 39. 1945; Moldenke, *Alph. List Cit.* 1: 31, 108, 114, 125—127, 175, 191, 202, 203, 226, 242, 246, 262, 270, 279, 280, & 295—297. 1946; Moldenke, *Phytologia* 2: 327, 329, & 331 (1947) and 2: 478. 1948; Moldenke, *Wrightia* 1: 233. 1948; H. N. & A. L. Moldenke, *Pl. Life* 2: 90. 1948; Moldenke, *Alph. List Cit.* 2: 392, 400, 407, 439, 450, 467,

470--475, 477, 480, 483, 489, 491, 492, 494, 497, 505, 506, 521--524, 527, 528, 538, 539, 549, 594, 595, 597, 598, 617, & 639--641 (1948), 3: 667, 673, 677--679, 682, 684, 701, 722, 723, 729, 731, 748, 752, 754, 768, 769, 779, 784, 789, 795--797, 824, 839, 848, 858, 873, 883, 914, 932, 950, 952, 954, 963, 965, 970, & 973 (1949), and 4: 990--992, 996, 997, 1004, 1086, 1093, 1107--1109, 1111, 1115, 1138, 1139, 1141, 1142, 1148, 1150, 1151, 1154, 1155, 1166, 1167, 1174, 1203, 1213, 1223, 1225, 1226, 1229--1231, 1240, 1243, 1244, 1252, 1255, & 1289--1291. 1949; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 17, 20, 21, 24--26, 33, 165, & 200. 1949; Moldenke, *Am. Wild Fls.* 292 & 450. 1949; Moldenke, *Phytologia* 3: 73 & 132 (1949) and 3: 458. 1951; McDougall & Sperry, *Pl. Big Bend Nat. Park* 146 & 148, fig. 146. 1951; Moldenke in Chittenden, *Roy. Hort. Soc. Dict. Gard.* 6: 2209 & 2213. 1951; Moldenke, *Inform. Mold. Set 48 Spec.* [4]. 1954; Klots, *Desert Life* 7, 8, & 61, fig. 8. 1954; Moldenke, *Résumé* 21, 25, 26, 30--32, 40, 149, 225, 372, & 474. 1959; Irwin, *Roadside Flow. Tex.* 189. 1961; Lewis & Oliver, *Am. Journ. Bot.* 48: 639--641, fig. 5. 1961; Moldenke, *Phytologia* 8: 123 & 149--152 (1961) and 8: 177, 182, 207, 213, 215, 243, 279, 397, & 436. 1962; Moldenke, *Résumé Suppl.* 3: 36 & 41 (1962), 5: 4 (1962), and 6: 3. 1963; Moldenke, *Phytologia* 9: 15--17, 24, 27, 84, 87, 131, 133--136, 144, 215, & 220 (1963), 10: 92, 94, 98, 102, & 107 (1964), and 11: 32, 47, & 48. 1964; Moldenke, *Résumé Suppl.* 8: 1. 1964; Moldenke in Shreve & Wiggins, *Veg. & Fl. Son. Des.* 2: 1245. 1964; Moldenke, *Phytologia* 11: 257 & 308. 1965.

Illustrations: Perry, *Ann. Mo. Bot. Gard.* 20: pl. 13. 1933; McDougall & Sperry, *Pl. Big Bend Nat. Park* 148, fig. 146. 1951; Klots, *Desert Life* fig. 8. 1954; Lewis & Oliver, *Am. Journ. Bot.* 48: 640, fig. 5. 1961.

Erect annual herb, to 60 cm. tall, often globose or in clumps, branched from the base, often spreading, with a short taproot; stems usually several from a common base, decumbent-ascending to erect, branched, sparsely hispid-hirsute; leaves subsessile or contracted into a short margined petiole, decussate-opposite; leaf-blades 2--4 cm. long, bipinnatifid or trifid, with the divisions more or less deeply incised, the ultimate segments narrowly lanceolate, hirtellous or hirsute on both surfaces; spikes short-pedunculate, more or less compact in fruit; bractlets lanceolate, shorter than the calyx, acute or acuminate at the apex, hirsute-ciliate; flowers fragrant, showy when in bloom; corolla hypocrateriform, varying from pink, rose-pink, lilac-pink, deep-pink, attractive bright-pink, bright purplish-pink, pinkish-lavender, deep pink-lavender, pinkish, or reddish to lavender, rose-lavender, rose, rose-purple, purplish, purple, light-purple, cerise, mauve, magenta, or even blue, its tube 11--12 mm. long, pubescent around the throat, the limb 6--8 mm. wide, the lobes retuse at the apex; fruiting-calyx 7--9 mm. long, densely glandular, somewhat viscid-pubescent, hirsute on the veins, its teeth short, unequal, subulate, usually less than 2 mm. long; cocci 2.5--3 mm. long, reticulate-scrubulate above, striate toward the base, the commissural faces muricately scabrous; chromosome number: $n = 10$, $2n = 20$.

The type of this species was collected by Charles Wright (no. 1504, in part) -- in whose honor it is named -- near Frontera, on the borders of Texas and adjacent New Mexico and Chihuahua, and is deposited in the Gray Herbarium at Harvard University. Jackson (1895) ascribes the species, from its original publication, to "Mexico". Parry, Bigelow, Wright, & Schott s.n. in the Britton Herbarium is probably a topotype, collected on March 22, 1852. The specific epithet is often uppercased.

The type of V. pinnatifida M. E. Jones was collected by Marcus Eugene Jones in Bernalillo County, New Mexico, and is deposited in the herbarium of Pomona College; that of V. aubletia var. bipinnatifida was gathered by August Fendler (no. 586) in waste fields and low valleys in the mountains of Santa Fe County, New Mexico, and is deposited in the herbarium of Dartmouth College at Hanover, New Hampshire; and that of V. bipinnatifida var. latifolia Perry was collected by R. M. Scholl (no. 11) in Culberson County, Texas, and is deposited in the herbarium of the University of Texas at Austin (but the same trinomial accredited to Scholl himself, based on his no. 8, is V. ambrosifolia Rydb.). The V. pinnatifida of Lamarck is a synonym of V. hastata L., while those of Nuttall and of Schauer are V. bipinnatifida Nutt.

E. D. Schulz 4057 has a notation on its label to the effect that the "flowers [are] much deeper in color than those of V. bipinnatifida." For the benefit of those interested in the color variations of this species [or, what may be the more likely situation, the color-concepts and color-definitions of its collectors!], I give herewith the corolla color as recorded on various of the cited collections: "lavender" - Lundell & Lundell 10222, Nelson & Nelson 4983; "rose-lavender" - Archer 3427; "pinkish-lavender" - Lundell & Lundell 10177 & 10244; "deep pink-lavender" - E. R. Schulz s.n. [near Alpine, Aug. 4, 1928]; "pink" - Lundell & Lundell 10255, McVaugh 12300; "pinkish" - Nelson & Nelson 5017; "deep-pink" - Correll & Rollins 23676, Lundell & Lundell 16941; "rose-pink" - Lundell & Lundell 13127, 13185, & 14339; "bright purplish-pink" - McVaugh 7868; "attractive bright-pink (not purplish)" - McVaugh 7508; "lilac-pink" - H. N. Moldenke 10080; "rose" - Ferris & Duncan 2647, C. H. Mueller 8215; "rose-purple" - E. D. Schulz s.n. [8/31/1931], P. C. Standley 40625; "reddish" - R. L. McGregor 16712; "purplish" - Lundell & Lundell 10247; "purple" -- Whitehouse 19537; "light-purple" - D. W. Lee 3; "cerise" - Correll & Johnston 18402; and "blue" - Stanford, Retherford, & Northcraft 241.

Little & Campbell (1943) regard V. ambrosifolia Rydb. as a synonym of V. wrightii, but, although they are admittedly very closely related, I feel that both are worthy of being upheld. Specimens with intermediate characters may prove to be hybrids.

Verbena wrightii has been found growing on plains and outwash

plains, hills and dry hills, as well as on banks in lava-covered hills, hillsides, dry or rocky hillsides, dry or grassy slopes, unwooded or rocky mountain slopes, the dry slopes of canyons, on mountainsides and semi-desert mountainsides, banks and flats, dryish gravelly banks and dry flats, on rocks and ridges, gravel bars, on sandy plains and rolling grasslands, on rocky canyon walls, and the banks of mountain streams. Collectors have encountered it in cleared or cultivated ground, in dry ground along railroads, in loose or rocky soil, in sandy or in sandy-rocky soil, in moist loam, and in rich loam soil, along roadsides and sandy roadsides, disturbed roadsides, arroyos, creeks, and moist streamsides, and among large granite boulders. It inhabits canyons and canyon beds, mountains and dry valleys, dry gravelly creekbeds and dry draws, arid aeolian deposits, deserts and desert washes, rolling or desert grasslands, foothills and valleys, sandy draws in the hills, burrow pits and desert areas, in the juniper belt, in washes at the base of buttes, and in gravel and sand beds on rocky slopes, at altitudes of 2100 to 7800 feet, flowering and fruiting from February to November.

In Colorado it was found by Loughbridge "in dry light adobe clay soil on gentle southwesterly slope, heavily overgrazed area, associated with Juniperus monosperma, Pinus edulis association, with Artemisia spp., Eurotia, Bouteloua, etc., density 30 percent", while Baker, Earle, & Tracy call it "a common weed in places" there. In Oklahoma it was found by Hopkins & Valkenburgh "on top of mesa in black volcanic rock and soil derived from it in dry xeric plateau."

In Texas it is said to be found generally in fields, flats, and dry gravelly creekbeds and bars and on dry or semi-desert hillsides and slopes, blooming from February to November, in the western and central sections of the state from El Paso and Presidio to Bexar and Guadalupe Counties. In Jeff Davis County it is described by Hinkley as "frequent", by McVaugh as "common....[in] rocky soil along roadside", by the Moores as "very common" in limestone gravel soil on highway embankments, while Tharp says "along spring in lavas, semi-abundant near spring, the only place found". Hanson calls it "frequent on rocky hillsides" in Presidio County, while York found it there "in creosote-blackbrush association". Janszen observed it growing "in buff silt, alluvial cover, hilly topography" in Culberson County. Waterfall found it in "calcareous soil along depression and ditch through Larrea-Prosopis association" in Reeves, "in Yucca-Agave association" in El Paso, and "in gypseous soil on level plain in Prosopis-Gutierrezia association" in Culberson County. M. S. Young calls it "common in open valley"; Cory says "infrequent on highway shoulders" in Reeves, and Warnock calls it "scattered" or "infrequent in igneous soil" in Brewster County. The last-named collector also found it to be "infrequent in limestone hills" and "frequent along highway in low limestone hills" in Hudspeth, "frequent on limestone flats" and "frequent on rocky igneous soil" in Brewster, "infrequent in rocky igneous soil" in Jeff Davis, "infre-

quent on limestone slopes" in El Paso, "frequent along highway in red sandy soil" and "abundant" in Presidio, "frequent" in Reeves, and "frequent in limestone soil along highways" in Pecos Counties.

In New Mexico, according to Fendler, it inhabits "waste fields and low valleys in the mountains", while Waterfall found it in "desert grasslands with some Nolina" and "on stony hillsides, with Nolina and Acacia"; P. C. Standley says that it is "common" in Slaughter Canyon in the Guadalupe Mountains. Benson reports it from the Upper Sonoran Zone in Arizona, while Wagenknecht says that it is "common in sandy soil along edge of roadsides".

In Nuevo León the species inhabits "rock and gravel in xerophytic canyons", according to Painter, Lucas, & Barkley, while in Coahuila it is said by McVaugh to be "abundant in open sandy slopes of mountain valley sparsely wooded with oak and pinyon" and McGregor reports it as "scattered in dry rocky open range", while Stanford, Retherford, & Northcraft found it "in playa valleys with considerable drainage from surrounding hills, with Larrea, Acacia, and herbaceous weeds common." It was introduced into cultivation in or about 1937.

In Shreve & Wiggins (1964) it is stated that V. wrightii grows "In moist rich loam among boulders, loose sandy or rocky soil, or even dry, light adobe clay or calcareous soil, Lower Sonoran to lower parts of Arid Transition Zones (to 7,000 feet), western Arizona near Wickenburg to Colorado, Oklahoma, and Texas and south to San Luis Potosí."

G. J. Harrison 1960 has the pubescence of the calyx and bractlets very short -- it bears a notation by T. H. Kearney, dated October 16, 1934, reading "gland about as large as the anther cells and equalling or somewhat surpassing them." The Wootton 642, distributed as "V. bipinnatifida x wrightii", seems to be V. ambrosifolia Rydb. Eggert (1902) states that V. wrightii hybridizes with V. racemosa Eggert, but I have not as yet seen any specimens of such a hybrid, nor does he cite any.

Verbena wrightii is called "desert verbena" and "Wright's verbena". Wyman & Harris (1941) report that the Navajo Amerinds make an irritant medicine from this plant, called "'ze.ʔñčj.ʔ i."

Material of this species has been misidentified and distributed in herbaria under the names V. ambrosiaefolia Rydb., V. ambrosiaefolia Rydb., V. ambrosifolia Rydb., V. ambrosiifolia Rydb., V. aubletia L., "V. aubletia (intermediate)", V. bipinnatifida Nutt., V. bipinnatifida x wrightii Wooton, V. canadensis Britton, V. ciliata Benth., V. ciliata var. longidentata Perry, V. ciliata var. pubera (Greene) Perry, V. gooddingii Briq., V. gooddingii Briq., V. neomexicana (A. Gray) Small, V. pinnatifida Lam., V. pubera Greene, V. pumila Rydb., V. supina L., V. teucrifolia Mart. & Gal., and even Labiatae.

On the other hand, the Archer 7349, Arsène 21865, Hitchcock & Stanford 6782, O. B. Metcalfe 126, C. H. Muller s.n. [Cat-tail Can-

yon, 7-6-32], A. Nelson 10548, Rozynski 312, P. C. Standley 40334, W. Stewart s.n. [Mimbres Mts., June 26, 1936], L. F. Ward s.n. [two miles south of Holbrook, June 17, 1901] & s.n. [Woodruff, June 20, 1901], B. H. Warnock W.283, Wooton & Standley 3635, Wynd & Mueller 572, and M. S. Young s.n. [Davis Mts., 9/18/18], distributed as *V. wrightii*, are actually *V. ambrosifolia* Rydb.; the Edw. Palmer 1050, distributed as "*V. wrightii* Gray var.?", is also *V. ambrosifolia*; Holzinger s.n. [Santa Rita, Aug. 1, 1911] and R. R. Humphrey s.n. [9/2/34] are *V. ambrosifolia* f. *eglandulosa* Perry; Earle & Earle 526, Goodman & Hitchcock 1211, Kearney & Peebles 14234, MacDougal 317, Shreve 4367, Townsend & Barber 139, Mrs. C. D. Walcott s.n. [Grand Canyon, Aug. 1938], and Warnock & McBryde 14866 are *V. bipinnatifida* Nutt.; Griffiths 4833 is *V. bipinnatifida* var. *latilobata* Perry; L. D. Benson 9467, M. E. Jones 23244 & 26231, B. Maguire 10542, E. W. Nelson 3920, and Shreve 7926 & 8279 are *V. ciliata* Benth.; Wooton s.n. [Post, May 22, 1925] is *V. ciliata* var. *longidentata* Perry; Gould & Pultz 3154, Maguire, Richards, & Moeller 11503, L. F. Ward s.n. [near Black Tank, June 1, 1901], and Wooton s.n. [mesa near N. H. Ranch, July 13, 1906] are *V. ciliata* var. *pubera* (Greene) Perry; Barneby 2806, Eggleston 10813, and E. G. Marsh 1225 & 1258 are *V. elegans* H.B.K.; E. W. Nelson 3896 and Edw. Palmer 1052 are *V. elegans* var. *asperata* Perry; Borell s.n. [Bonita Canyon, Sept. 8, 1935], Cutler 2002, D. R. Goddard 525 & 825, Goodding 76-52, Griffiths 4435, C. F. Harbison 41178, W. W. Jones s.n. [Dragoon, Aug. 18, 1920], Kearney & Peebles 9720, 11118, & 12669, Peebles 6732, Wooton s.n. [Kingman, Aug. 13, 1911], and Zuck s.n. [Tucson, May 16, 1896] are *V. gooddingii* Briq.; E. B. Bartram 257, Goodding 952, P. B. Kennedy 7033, J. G. Lemmon s.n. [Huachuca Mts., Aug. 1882], and Mearns 1904 & 1914 are *V. gooddingii* var. *nepetifolia* Tidestr.; while B. H. Warnock T.44 & T.45 are *V. wrightii* f. *albiflora* Moldenke.

C. C. Ellis 17 and Wooton 364 are mixtures with *V. ambrosifolia*; B. H. Warnock T.66 is a mixture with *V. ciliata*; M. E. Jones 3801 and Tracy & Earle 162 are mixtures with *V. ciliata* var. *pubera*; Wencurtin s.n. [5-2-1916] is a mixture with *V. pumila* Rydb.

A. Nelson 11338 has been identified by me in some herbaria as *V. ambrosifolia*; Eastwood 8468 in the herbarium of the California Academy of Sciences and J. Skehan 5 also greatly resemble *V. ambrosifolia* and may be that taxon or else a hybrid.

Tharp 46090 in the Stockholm herbarium is inscribed "Dona Ana Co., Texas" in error. The P. C. Standley 40625, cited below from Otero County, New Mexico, may have been collected in Chaves or in Eddy Counties -- its label is inscribed "Slaughter Canyon in Guadalupe Mts."; the J. J. Thornber s.n. [6/21--23/05] could be from Pima

or Pinal Counties, Arizona -- the label is inscribed "Reddington--Mammoth"; Eastwood 15697 may be from Bernalillo or McKinley Counties -- the label is inscribed "between Albuquerque and Gallup"; Worth & Priest 540b may have come from Lincoln or Socorro County, New Mexico -- the label reads "between Carrizoso and Socorro"; Tharp 3691, collected in Paisano Pass, could be from either Brewster or Presidio County since this pass leads from one to the other. Cottam 10244 is labeled "Old Fort Butterfield, Texas", and was probably collected somewhere along the route of the Butterfield Overland Mail (1858--1861) which followed a route from Grayson through Cooke, Jack, Nolan, Upton, and Pecos Counties to El Paso. Dr. Geiser thinks that the locality refers to the pineries at the corner of Hudspeth and Culberson Counties, where Cottam is known to have collected Verbena specimens.

The Coult., Contrib. U. S. Nat. Herb. 2: 328 reference in the bibliography of this species is often cited as "1894", but apparently should be 1892.

Perry (1933) cites the following 43 additional specimens not as yet seen by me: COLORADO: La Plata Co.: Baker, Earle, & Tracy 531 (E, G). TEXAS: Brewster Co.: Moore & Steyermark 3324 (E). Culberson Co.: Eggert s.n. [flats near Van Horn, 13 May 1901] (E, G); Young s.n. [Guadalupe Mountains, 9 Sept. 1916] (E). Hudspeth Co.: Havard 97 (G); Thurber 143 (G). Jeff Davis Co.: Ferris & Duncan 2647 (E); E. J. Palmer 30672 (E); Tracy & Earle 162, in part (E, F, G, W). Presidio Co.: H. C. Hanson 551 (E). Terrell Co.: E. J. Palmer 33583 (E). Ward Co.: Tracy & Earle 61 (E, F, G). County undetermined: C. Wright 1504, in part [Fronteras] (G--type), s.n. [mountains near Fronteras, 22 March 1852] (E). NEW MEXICO: Bernalillo Co.: C. C. Ellis 17, in part (E); Kammerer 33 (E). Dona Ana Co.: P. C. Standley s.n. [Organ Mountains, 11 June 1906] (E). Grant Co.: Eastwood 8468 (G); Eggleston 17231 (E); E. L. Greene s.n. [near Silver City, 1880] (E); O. B. Metcalfe 126, in part (E, G); Pilsbry s.n. [Gallina's Canyon, Black Range, 17 Aug. 1915] (D). Lincoln Co.: Wooton 364, in part (E, G). Otero Co.: O. B. Metcalfe 1090, in part (E, G); Rehn & Viereck s.n. [Alamogordo, 7 April--24 May 1902] (D, E); Viereck s.n. [High Rolls and vicinity, 21--28 May 1902] (D). San Miguel Co.: Mulford 37 (E). Santa Fe Co.: Heller & Heller 3536 (E, G). County undetermined: Wislizenus 483 [Rabbit Ear Creek] (E); C. Wright 1503, in part [1851--52] (E). ARIZONA: Apache Co.: Marsh 14224 (E). The Bigelow s.n. which she cites from "NY" is actually in the Columbia University Herbarium; her "Heller 3536" is the same collection cited below as Heller & Heller 3536, and the Wright s.n. which she cites as from Fronteras and deposited at "NY" is the Parry, Bigelow, Wright, & Schott s.n. cited below. The Clawson 13923 which she cites is regarded by me as representing V. ambrosifolia. Her Ellis 17, Wooton 364, and Met-

calfe 126 & 1090 appear to be mixtures with V. ambrosifolia. The H. S. Barber 106, Griffiths 4757, W. Hough 109, Peebles 5353, Toumey 304 1/2, and Zuck s.n. [Snowflake, July 30, 1897], cited both by Perry and by me as V. ciliata Benth., were all annotated by T. H. Kearney in the United States National Herbarium as "Verbena Wrightii ?"

Perry (1933) says of V. wrightii "On account of its strong variability, this species has been exceedingly difficult to define. It was first set apart as an erect annual, with anther-glands as high and almost as large as the anther-cells. In the series of specimens at hand, the anther-glands are neither constant in size nor in height relative to the anther-sacs. The main characters appear to be the glandular somewhat viscid pubescence of the calyx, the very short acute-subulate calyx-teeth, and the somewhat compact spikes."

In all, 454 herbarium specimens, including type material of most of the names involved, have been examined by me.

Citations: KANSAS: Finney Co.: W. R. Dudley s.n. [near Garden City, June 10, 1896] (Du--24171). COLORADO: Boulder Co.: A. G. Vestal 373 (Du--140526). El Paso Co.: R. B. Livingston 3131 (H--63112). Fremont Co.: Degener & Degener 27016 (N, Z). La Plata Co.: Baker, Earle, & Tracy 531 (Cm, Du--151797, Mi, N, Po--63889, W--337397); Eastwood 5368 (Gg--31289); Ferril s.n. [May 11, 1906] (Bl--42301); Loughridge 461 (Bt--24702); R. W. Pohl 2002 (Up); Ramaley 16163 (Bl--43765); Way s.n. [Oxford, 1916] (Bl--42358). Las Animas Co.: Herb. State Agric. Coll. 4184 (N). County undetermined: H. L. Zobel s.n. [Deer Creek Canyon, May 25, 1934] (Bt). OKLAHOMA: Cimarron Co.: G. J. Goodman 2412 (Io--143360, N); Goodman & Waterfall 4811 (St); Hopkins & Van Valkenburgh 5809 (N); G. W. Stevens 484 (Du--65886). Harper Co.: G. J. Goodman 2398 (Io--143358). TEXAS: Bexar Co.: Havard s.n. [San Antonio] (W--221164). Brewster Co.: Collector undesignated L.1-3 (Sr); Ferris & Duncan 2876 (Du--124241), 3000 (Du--124409); G. L. Fisher s.n. [Alpine, Aug. 23, 1932] (Wi); Herb. Univ. Texas s.n. [Marathon, 6/4/31] (Au, Au, Au); Lewis & Oliver 5451 (Nb), 5454 (Nb); C. L. Lundell 13185 (N, Rf); Lundell & Lundell 10244 (Ld, N, W--1888908); W. B. McDougall s.n. [10/5/35] (Mv); R. McVaugh 7868 (Ar--233632, Ar--178200, Mi); A. R. Moldenke 168 (Fg); Moore & Steyermark 3324 (Ca--471228, Du--224478, Gg--194780, Mi, N, W--1566749); C. H. Mueller 8140 (Au, Mi, N, N); L. T. Murray s.n. [Chisos Mts., July 24, 1938] (Ar--219761); Nelson & Nelson 5025 (Ka); Parks & Cory 6471 (Tr), 7337 (Tr), 9148 (Tr); Rose-Innes & Warnock 586 (Au); E. D. Schulz s.n. [near Alpine, Aug. 4, 1928] (Wi), s.n. [8/4/1928] (Wi); O. E. Sperry 75 (W--1684175), 1737 (Om), T.126 (Om), T.130 (Om, W--1679253), T.573 (Fs, Om), T.1073 (Ca--882852), T.1142 (Ca--882851);

Steiger 1053 (N), 1133 (N); Tharp 8840 (Au, Au), s.n. [Chisos Mts., 5-10-37] (Mi); B. H. Warnock 66 (W--1730933), 75 (N), 4000/7051 (Au--122863), 4700/5562 (Au--122862), 9953 (Rf), 20022 (Au, Ok, S), C.802 (N), T.66, in part (Au), W.167 (N), W.283 (Au, N); M. S. Young s.n. [8/12/15] (Au), s.n. [9/12/15] (Au). Crane Co.: Lundell & Lundell 10222 (Ld, N). Culberson Co.: Hitchcock & Stanford 6782 (Pl--116714, Rs--30824, Se--69417); Janszen 420 (Au--121659); Lehman s.n. [June 28, 1939] (Tr); Scholl 11 (Au--121658); O. E. Sperry T.129 (W--1679252); Waterfall 3775 (Tu--116233). El Paso Co.: B. Barlow s.n. [Canutillo, 12 July 1911] (Ca--882860, La, W--1430157); Benedict 16 (W--1568212); M. K. Clemens s.n. [El Paso, Oct. 24, 1916] (Po--173749); Knobloch 1692 (Mi); Lundell & Lundell 16941 (Rf); R. L. Oliver 95 (Nb); Shinners 8994 (Sm); B. H. Warnock 4650/7358 (Au--122853), 7358 (Rf), 10411 (Rf); Waterfall 3922 (St, Tu--128443). Guadalupe Co.: Earle & Earle 430 (N); M. S. Young s.n. [9/9/16] (Au). Hudspeth Co.: Havard 97 (W--147594); C. H. Mueller 8215 (Sm); Thurber 143 (C); B. H. Warnock 4100/5912 (Au--122852), 13813 (Au--171956, Rf). Jeff Davis Co.: Bequaert s.n. [May 1, 1961] (Au--208171); Correll & Johnston 18402 (Rf); Cory 17569 (Md), 27903 (N), 53075 (Sm), s.n. [Sunny Glen Canyon, 8-29-27] (Tr); Earle & Tracy 162, in part (N); Ferris & Duncan 2647 (Ba, Du--126171, Gg--31429, N, Po--127357); E. Hamby 1112 (Ar--206808); Herb. Univ. Texas 71 (Po--161328); L. C. Hinckley 114 (N), s.n. [Mt. Livermore, 10-13-34] (Au, Au), s.n. [H. O. Canyon, July 27, 1937] (N), s.n. [8/2/37] (Fs); Lundell & Lundell 10255 (Ld, N), 13127 (Rf, Sm); R. McVaugh 7508 (Mi, Rf, Sm); A. R. Moldenke 647 (S); Moore & Moore 2 (Ca--755008, N, S); E. J. Palmer 32195 (Au); Parks & Cory 9599 (Tr), 9635 (Tr), 17568 (Tr), 17653 (Tr), 18893 (Tr); H. R. Reed 101 (Ar--307333, N); E. D. Schulz 4057 (Wi); Tharp 51-22 (Au--121583); Tharp & Janszen 49-1140 (Au--121573, Lw); Tracy & Earle 162, in part (Au), 162a (N); B. H. Warnock 5900/5684 (Au--122854), 13547 (Au--198386, Rf), 21676 (N); S. E. Wolff 1666 (W--1623954); M. S. Young s.n. [Davis Mts., 9/18/18] (Ur). Montgomery Co.: Brenckle & Brenckle 51103 (Le). Pecos Co.: G. L. Fisher 36105 (W--1679361), s.n. [July 20, 1936] (Se--69271); Goodman & Waterfall 4565 (Ok); Lundell & Lundell 10177 (Ld, N, W--1887631); B. H. Warnock 13956 (Rf), C.802 (Au, N); Whitehouse 19537 (Mi, N); S. E. Wolff 4390 (Tr). Presidio Co.: Correll & Rollins 23676 (Ld); Cory 31173 (N); Drushel 11102 (N); H. C. Hanson 551 (N, W--982893); L. C. Hinckley 1934 (N), s.n. [July 9, 1941] (Au); D. C. Ingram 2388 [Herb. Forest Serv. U. S. D. A. 96393] (S), 2467 [Herb. Forest Serv. U. S. D. A. 96394] (Au--186858, W--2344745), 2533 [Herb. Forest Serv. U. S. D. A. 96395] (Au--186864); J. Knight s.n. [Marfa, 9-29-32] (Au);

Lundell & Lundell 10247 (N), 14339 (N, Rf); Tharp 3691 (Au); B. H. Warnock 4300/5601 (Au--122851), 14594 (Rf); C. L. York 48064 (Au--122008). Reeves Co.: Cory 52259 (N); Nelson & Nelson 4983 (Au, Ka), 5014 (Au, Ca--710303), 5017 (W--1974035); Parks & Cory 18358 (Tr); B. H. Warnock 9945 (Rf); Waterfall 4386 (N, Tu--31203). Val Verde Co.: E. D. Schulz s.n. [8/31/1931] (Wi). Ward Co.: Tracy & Earle 61 (Au, Cm, Es, N, N, Vt, W--441790). County undetermined: Cottam 10244 [Old Fort Butterfield] (Fs); Parry, Bigelow, Wright, & Schott s.n. [Frontera, Mar. 22, 1852] (N--topotype). NEW MEXICO: Bernalillo Co.: C. C. Ellis 17, in part (W--890528); M. E. Jones 457 (Po--83728), s.n. [Albuquerque, Sept. 5, 1884] (Gg--154421, N, Tu), s.n. (Po--65185); Kammerer 33 (N); D. F. Morgan s.n. [summer, 1939] (Ok); Mulford s.n. [near Albuquerque, Sept. '95] (Ur); H. H. Rusby s.n. [Albuquerque, Sept. 5, 1909] (N). Catron Co.: O. B. Metcalfe s.n. [Mangas Spgs., Aug. 1901] (W--562286); A. R. Moldenke 155 (Fg). Chaves Co.: G. J. Ikenberry 389 (St); Steiger 290 (N); Waterfall 10566 (St). Dona Ana Co.: Archer 3427 (H--68552); Ellison 783 (La), s.n. [Organ Mts., Sept. 1, 1929] (La); M. E. Jones s.n. [Rincon, 5-16-1890] (Po--71163); Munz 13263 (Ca--537032, Po--204037, Ua--25323, Va--14830); P. C. Standley s.n. [Mesilla Valley, May 21, 1906] (W--560978), s.n. [Van Pattens, June 11, 1906] (W--560979); Tharp 46090 (Au, N, S); Wooton 174 (Du--91155), 1900 (Au), s.n. [Organ Mts., May 15, 1892] (Ca--112317), s.n. [Organ Mts., Apr. 30, 1893] (Hp, W--241163), s.n. [Sept. 15, 1893] (We), s.n. [Organ Mts., Aug. 29, 1894] (C, N), s.n. [Van Pattens, Aug. 29, 1894] (W--736872), s.n. [Organ Mts., May 8, 1895] (Po--70880), s.n. [Apr. 15, 1899] (Bl--42342), s.n. [June 7, 1900] (Du--91154), s.n. [Organ Mts., 1900] (N, W--560635), s.n. [May 26, 1904] (Fs), s.n. [Filmore Canyon, May 25, 1905] (W--736871), s.n. [June 10, 1906] (Ob--50878). Eddy Co.: V. Bailey s.n. [Carlsbad Cave, Apr. 15, 1924] (W--1220144); D. W. Lee 3 (W--1203610); A. Nelson 11401 (Ca--500719, S); Waterfall 3720 (Tu--115260), 10614 (St); Wilkins 1736 (En). Grant Co.: Bigelow s.n. [Copper Mines, July 28th 1851] (C); Blumer 44 (W--563467); Eastwood 8468 (Gg--31427, W--1102096); Eggleston 17231 (N); Emery s.n. [Oct. 17th 1846] (C); G. L. Fisher 36132 (W--1679375); E. L. Greene s.n. [near Silver City, June 1880] (Po--71129), s.n. [26 July 1880] (Vt), s.n. [Aug. 3, 1880] (Pa); Holzing s.n. [Fierro, July 29, 1911] (W--660556); Layton s.n. [Santa Rita, Sept. 1931] (Io--138119); Mearns 108 (Du--24198); O. B. Metcalfe 126, in part (Po--70888); Mulford 681 (N); W. Stewart s.n. [Mimbres Mts., June 26, '36] (La); C. B. Wolf 2598 (Ba, Rs--9997). Guadalupe Co.: F. C. Gates 20979 (Ka--922651); Harwood s.n. [Vaughn, 9-10-1921] (Po--18602); A. R. Moldenke 126 (Fg);

A. Nelson 11338 (Du--218830, N, N), 11388 (Ca--500720, S); B. L. Wagenknecht 4754 (Lw). Lincoln Co.: De Busk s.n. [U. S. Dept. Agr. Soil Conserv. Serv. 6005] (Tu--104392), s.n. [U. S. Dept. Agr. Soil Conserv. Serv. 6006] (Tu--104396); Earle & Earle 236 (N, W--382398); L. C. Hinckley 750 (N, N), 776 (N); Hitchcock, Rethke, & Raadshooven 4264a (Ca--603732, Gg--267613); A. Lee 9 (Au, N); F. G. Plummer s.n. [Lincoln National Forest, 1903] (W--563048); J. Skehan 5 (W--350124); Wooton 364, in part (Ca--138816, Du--75577, Ka, Po--71124, Ur); Wooton & Standley 3635 (Du--9536). Luna Co.: Abrams 7259 (Du--98413), s.n. [May 1919] (Du--98125); M. E. Jones 3801, in part (Gg--130524); Mearns 109 (Du--24191, W--56226), s.n. [April 17, 1892] (Du--24195). McKinley Co.: Eastwood 15697 (Gg--161738). Otero Co.: F. S. Earle 539 (N); Goodman & Waterfall 4995 (Ok); G. J. Ikenberry 256 (Ok, St); Layton s.n. [Alamogordo, Sept. 1931] (Io--138743); Orcutt s.n. [Cloudcroft, July 23--26, 1926] (Sd--23256); Rehn & Viereck s.n. [Alamogordo, Apr. 16, 1902] (I, La, Mg--35, Po--148610); E. D. Schulz 549 (Wi); P. C. Standley 40625 (W--1222015); Waterfall 10603a (St); Wooton s.n. [Divide above Mescalero Agency, June 23, 1895] (W--736223), s.n. [Along Tularosa Creek, Aug. 18, 1899] (W--736870), s.n. [White Sands, Aug. 25, 1899] (W--736883). Quay Co.: G. L. Fisher s.n. [Nara Visa, Apr. 21, 1911] (Gg); G. J. Ikenberry s.n. [May 1, 1937] (St). Sandoval Co.: Arsène 20890 (Du--253899); Hedgcock 218 (Se--95967). San Miguel Co.: G. J. Goodman 2308 (Mn--26305, N); G. B. Grant 5758 (Du--75652); Mulford 37 (Io--34047, N, Ur); A. Nelson 11566 (Ca--500723, Du--218832, S); Sturgis s.n. [May 4, 1902] (Ca--216687). Santa Fé Co.: Arsène & Benedict 16555 (I); Fendler 586 (Dt); Heller & Heller 3536 (Du--24168, Ka, N, Ob--50861, Pl--72006, Po--63892, Ur, W--306423); D. F. Morgan s.n. [summer, 1939] (Ok); A. Nelson 11757 (Ca--500722, Du--218831); W. W. Robbins 8242 (Bl--42298); Snow s.n. [Santa Fé, Aug. '80] (H--107719), s.n. [Santa Fé, Aug.] (Ca--67417). Sierra Co.: Cutler 2065 (Ok); O. B. Metcalfe 1090, in part (Gg--31428, N, Po--84188). Socorro Co.: S. B. Benson 323 (Ca--526578); D. B. Dunn 3081 (Lb--48494); C. L. Herrick 704 (W--737263); A. R. Moldenke 636 (S); H. H. Rusby 337, in part (Pr); Wooton s.n. [Devil's Park, Aug. 9, 1900] (W--736934); Worth & Priest 540b (Ba, N). Torrance Co.: F. Clark 460 (St--9203). Union Co.: Wooton s.n. [20 miles west of Patterson, June 21, 1892] (W--562252). Valencia Co.: O. Degener 4853 (Ms); Wooton s.n. [west of Grant's Station, Aug. 2, 1892] (W--562253), s.n. [south of San Rafael, July 29, 1906] (W--736873). County undetermined: De Busk s.n. [Bottomless Lake Hills; U. S. Dept. Agr. Soil Conserv. Serv. 6007] (Tu--104395); Ehlers & Ehlers 6304 [Wilma] (Mh, Mi); Mexican Bound. Surv. s.n. (N); Vasey

s.n. (Ka); Wencurtin s.n. [5-2-1916] (Au). ARIZONA: Apache Co.: L. D. Benson 9555 (Du--326793, Po--267659, Tu--7643); Deaver 1784 (Fg); Griffiths 5190 (W--496584); A. R. Moldenke 153 (B, Fg, S); R. L. Oliver 91 (Nb). Cochise Co.: Cottam 10201 (Fs); J. J. Thornber 4346 (Tu). Coconino Co.: H. H. Rusby 337, in part (Ca--67972). Graham Co.: Eggleston 19912 (W--1524974); Maguire & Maguire 10117 (Ca--676071, N, Pl--130552, Ua--47410), 10179 (Gg--295127, N, N, Ua--47408); Spangehl s.n. [Thatcher, May 1936] (Tu); Thornber & Shreve 7899 (Ok). Greenlee Co.: Maguire, Richards, & Moeller 10095 (N, N, Ua--47409), 11676 (N, N, Ua--47411). Mohave Co.: Kearney & Peebles 12669 (To). Navajo Co.: A. Nelson 10358 (Bt--19646); Peebles 9614 (W--1624359); Peebles & Fulton 9614 (To); L. F. Ward s.n. [Woodruff, June 20, 1901] (N). Pima Co.: Spaulding 37 (Tu). Pinal Co.: G. J. Harrison 1960 (To); J. J. Thornber s.n. [Reddington--Mammoth, 6/21--23/05] (Tu). MEXICO: Coahuila: G. L. Fisher s.n. [Aug. 17, 1930] (I); Gregg s.n. [Saltillo, 6/67] (C); E. G. Marsh 707 (St), 1524 (St); R. L. McGregor 16712 (Lw); R. McVaugh 12300 (Mi); Stanford, Retherford, & Northcraft 241 (Ca--713461, Se--70282); Waterfall 15348 (St), 15782 (St); Waterfall & Wallis 13273 (St); Wynd & Mueller 572 (I). Nuevo León: Painter, Lucas, & Barkley 14281 (Au). San Luis Potosí: C. L. Lundell 5590 (Du--266212). SOUTHERN RHODESIA: Eyles 4349 (Rh). CULTIVATED: New York: T. H. Everett s.n. [H. N. Moldenke 10080] (N); Quinn s.n. [N. Y. Bot. Gard. Cult. Pl. SD.228-37] (N).

VERBENA WRIGHTII f. ALBIFLORA Moldenke, Résumé Suppl. 6: 3, nom. nud. (1963), f. nov.

Haec forma a forma typica speciei corollis albis recedit.

Bibliography: Moldenke, Résumé Suppl. 6: 3. 1963; Moldenke, Phytologia 11: 48. 1964.

This form differs from the typical form of the species in having white corollas.

The type of the form was collected by Barton Holland Warnock (no. T.44) on the campus of Sul Ross College at Alpine, Brewster County, Texas, on April 2, 1936, and is deposited in the Britton Herbarium at the New York Botanical Garden.

The stems are branched at the base, the branches erect or ascending, to 20 cm. or more in length. The plant is described by Cory as "infrequent on graded road 12 1/2 miles northeast of Fort Stockton" in Pecos County. Warnock calls it "infrequent on Jim Nichol's Ranch, Glass Mountains" in Brewster County. The Moores found it on sandy flats at 2200 feet altitude in Reeves County.

Material has been misidentified and distributed in herbaria as V. racemosa Eggert and V. wrightii A. Gray. It has been collected in flower and fruit in March and April.

In all, 8 herbarium specimens, including the type, have been examined by me.

Citations: TEXAS: Brewster Co.: B. H. Warnock T.44 (N--type, W--1730928--isotype), T.45 (N, N, W--1730929). Pecos Co.: Cory 53502 (N). Reeves Co.: Moore & Moore 4 (Ca--755057, N).

VERBENA XUTHA Lehm., Del. Sem. Hort. Hamb. 1834: 7--8. 1834.

Synonymy: Verbena strigosa Hook., Comp. Bot. Mag. 1: 176. 1836 [not V. strigosa Cham., 1832]. Verbena lucaeana Walp., Repert. Bot. Syst. 4: 23. 1845. Verbena matthesii Turcz., Bull. Soc. Nat. Mosc. 36 (2): 196. 1863. Verbena xanthi Gray ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena xutha Schm. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena zutha Lehm. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena xantha Lehm. ex Moldenke, Résumé 378, in syn. 1959. Verbena xanthii Lehm. ex Moldenke, Résumé 378, in syn. 1959. Verbena xertha Lehm. ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963. Verbena xuthia Lehm. ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963. Verbena xutha Lehm. ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963.

Bibliography: Lehm., Del. Sem. Hort. Hamb. 1834: 7--8. 1834; Linnaea 10: Litt.-Ber. 115. 1836; Hook., Comp. Bot. Mag. 1: 176. 1836; Walp., Repert. Bot. Syst. 4: 23. 1845; Steud., Nom. Bot., ed. 2, 2: 751. 1841; Engelm. & Gray, Pl. Lindheim. 1: 21. 1845; Schau. in A. DC., Prodr. 11: 547 & 555. 1847; Turcz., Bull. Soc. Nat. Mosc. 36 (2): 196. 1863; A. Gray, Syn. Fl. N. Am. 2 (1): 335. 1878; S. Wats., Proc. Am. Acad. Sci. 18: 135 & 136.. 1883; Coult., Contrib. U. S. Nat. Herb. 2: 327. 1892; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 148. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179 & 1180. 1895; A. W. Chapm., Fl. South. U. S., ed. 3, 369. 1897; J. K. Small, Fl. Southeast. U. S., ed. 1, 1009. 1903; J. W. Blankinship in Engelm. & Gray, Pl. Lindheim. 3: 186. 1907; J. K. Small, Fl. Southeast. U. S., ed. 2, 1009. 1913; Pellett, Am. Honey Pl., ed. 2, 354. 1923; Seymour, Host Ind. Fungi N. Am. 587--588. 1929; J. K. Small, Man. Southeast Fl. 1137. 1933; Perry, Ann. Mo. Bot. Gard. 20: 248, 261, 293--294, 342, 355, & 356. 1933; Cory, Texas Agr. Exp. Sta. Bull. 550: 89. 1937; Moldenke, Prelim. Alph. List Invalid Names 49. 1940; Moldenke, Suppl. List Invalid Names 9 & 10. 1941; Moldenke in Lundell, Fl. Texas 3 (1): 26--27 & 46--47. 1942; Moldenke, Alph. List Invalid Names 48, 50, & 51. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 6, 10, 13, 19, & 102. 1942; Moldenke, Bot. Gaz. 106: 159 & 160. 1945; Moldenke, Castanea 10: 40. 1945; Moldenke, Phytologia 2: 87 & 117 (1945) and 2: 163. 1946; G. L. Fisher, Am. Bot. Exchange List. 1946; Moldenke, Alph. List Cit. 1: 10, 11, 13, 17, 47, 49, 81, 89, 111, 125, 127, 154, 164, 166, 176, 183, 202--204, 207, 209, 221, 249, 253, 254, 278, 280, 283, 288, & 296. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 25. 1947; Pellett, Am. Honey Pl., ed. 4, 420. 1947; Moldenke, Phytologia 2: 328, 329, & 348. 1947; Moldenke, Wrightia 1: 225 & 226. 1948; Moldenke, Alph. List Cit. 2: 395, 397, 399, 405, 416, 439, 452, 471, 473, 474, 478, 489, 495, 506, 520, 522, 558, 598, 618, 627, & 632 (1948), 3: 657, 665, 671, 678, 679, 683--685, 696, 708, 713, 743, 750, 752, 755, 768--770, 784, 788,

795, 796, 798, 806, 844, 851, 855, 882, 914, 915, 942, 946, & 978 (1949), and 4: 986, 989, 990--993, 1003, 1069, 1107, 1108, 1111, 1113, 1122, 1129, 1132, 1139, 1147--1150, 1162, 1163, 1166, 1170, 1179, 1180, 1183, 1207, 1212, 1213, 1217, 1228, 1230, 1290--1292, & 1298. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 11, 18, 19, 25, 33, 165, & 200. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 14. 1949; Moldenke, Phytologia 3: 72 (1949) and 3: 450, 451, & 468. 1951; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2213. 1951; Moldenke, Inform. Mold. Set 48 Spec. [4]. 1954; Shinnars, Spring Fl. Dallas 326. 1958; Moldenke, Résumé 14, 15, 23, 30, 40, 225, 368, 369, 375, 378, & 474. 1959; Moldenke, Résumé Suppl. 1: 3 (1959) and 2: 3 & 10. 1960; Lewis & Oliver, Am. Journ. Bot. 48: 639--641, fig. 24. 1961; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 144. 1961; Moldenke, Phytologia 8: 124 & 435. 1961; Moldenke, Résumé Suppl. 3: 6 & 8 (1962), 4: 4 & 20 (1962), 5: 3 & 4 (1962), 6: 1--3, 9, & 11 (1963), and 7: 2. 1963; Moldenke, Phytologia 8: 471, 472, 477, 478, & 490 (1963), 9: 36, 81, 160, 165, & 215 (1963), 10: 99--101, 104, 108, 110, 140, 178, 182, 186, 211, 217, 218, 304, & 502 (1964), and 11: 13, 110, 111, 127, 128, & 201. 1964; Moldenke, Résumé Suppl. 8: 1 & 3 (1964) and 11: 3. 1964; Moldenke, Phytologia 11: 239 & 338. 1965.

Illustrations: Lewis & Oliver, Am. Journ. Bot. 48: 640, fig. 24. 1961.

Usually a tall, erect, annual or perennial herb, to 2 m. in height, coarse and spindly, sometimes bushy or even procumbent; stems upright or spreading, mostly 3.5--12 dm. tall, erect, tufted in clumps from a common base, tetragonal, branched, hirsute-hispid, rarely procumbent; leaves decussate-opposite, sessile; leaf-blades lanceolate (the upper ones) or oblong to broadly ovate in outline, 5--12 cm. long, the upper ones incised-pinnatifid, the lower ones more often trifid with the segments coarsely dentate or pinnatifid, the lateral segments much smaller than the middle one and close to the sessile base of the blade, strigose above, canescent and spreading-hirsute beneath, the hairs particularly conspicuous along the somewhat paler midrib and secondary veins; spikes lateral and terminal, simple, elongate, often 30 cm. long, 1--3 forming a panicle, somewhat strict, not compact except during anthesis, short-pedunculate, remote-flowered, subcanescent; flowers in subopposite pairs; bractlets lanceolate-subulate, subequaling or commonly a little shorter than the calyx, strigillose, ciliate-margined; calyx 3--4 mm. long, strigose-hirsute, its lobes acuminate-subulate, the green veins ending in mucros; corolla hypocrateriform, varying from blue, lavender-blue, pale lavender-blue, deep-blue, or lilac-blue to gray-lilac, blue-purple, purple, violet, purplish-violet, bluish-violet, blue-lavender, bluish-lavender, lavender, or pinkish-white, hirtellous, its tube approximately as long as the calyx, the throat white, pubescent outside, villous within, the limb medium in size, 5--8 mm. wide; cocci about 2 mm. long, raised-reticulate on the upper half, faintly striate below, the commissural faces reaching the apex of the coccus, muricate or muricately scabrous; chromosome number: $n = 21$.

The type of V. matthesii was collected by Benno Matthes (no. 13) -- in whose honor it was named -- in Fayette County, Texas. Hooker's V. strigosa was based on two collections of Thomas Drummond -- no. 253 bis from New Orleans, Orleans Parish, Louisiana, in 1832, and s.n. from New Orleans in 1833 -- deposited in the herbarium of the Royal Botanic Gardens at Kew. Verbena lucaeana is merely a new name for V. strigosa, although Tainturier s.n., from New Orleans, is the only specimen cited.

Hooker's description of his V. strigosa is as follows: "Verbena strigosa (n. sp.); strigoso-hirsuta, erecta, stricta, foliis sessilibus rugosis lato-lanceolatis profunde pinnatifidis incisis segmentis valde acutis nervis subtus prominentibus, spicis simplicibus paniculatisve elongatis, floribus laxiusculis. -- N. Orl. (n. 253 bis) and 1833. -- Of this I have received copious specimens, both from Mr. Drummond and from Tainturier, so that it must be a very common plant; yet it does not appear to have been taken up by any author, nor have specimens been transmitted to me through any other source than those now mentioned. Its nearest affinity is, perhaps, with V. stricta, but the leaves are strongly pinnatifid, harsh, with the principal veins more prominent on the under-side, yet not exhibiting such a strongly-reticulated appearance; the spikes are longer, more lax; the flowers much smaller, more distant, and not pressed to the rachis. It is a strong-growing plant, two to three feet high, quite hispid with appressed hairs or bristles."

Walpers (1845) places this species in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Micranthae, and Secondary Subgroup Schizophyllae with 9 other species. The specific name is often uppercased for no valid reason.

Verbena xutha inhabits sand, red or brown gravelly silty sand, open dry soil, low sandy or sandy loam soil, most streamsides, low roadsides, and the edges of thickets, fields, and roadsides. It has been found in waste ground, open or dry rocky ground, and sandy land, and woody and shady woods, swamps and dry swamps, coastal marshes, waste places, vacant lots, pastures, sandy swales, lowlands, fields and grassy fields, wet pinelands, low meadows, and swales in sandy prairies, along fencerows, roadsides, dry roadsides, and river battures, and on sandy wooded hillsides or open hillsides, beaches, levees, and strand, sandy foothills, gravel sandbars, dry riverbanks, bottoms and beach ridges, prairies, coastal and low coastal prairies, as well as sandy prairies near the coast, growing at altitudes of 1 to 160 meters, flowering from February to November, fruiting from May to November. It is native from Alabama to Arizona.

In Texas it is found in dry mostly sandy soil of beaches, fields, and roadsides and in blackland prairies, in the eastern and southern parts of the state from Bowie and Navarro to Jefferson and Cameron, west to Jeff Davis and Brewster Counties, flowering from March to October. Bush reports it as "common on prairie" in Brazoria County.

The Lundells found it along "roadside through pineland" in Hardin County, Traverse in "Panicum amarulum complex" in Chambers and "in ditch in railroad right-of-way, on sand with some clay, associated with grasses and various herbs" in Harris County; L. D. Smith "between field and wood border of stream" in McLennan, F. W. Gould in "partial shade along road through pine forest" in Liberty, Garberson "in sand-loam soil along highway" in Brazos, M. C. Johnston "in sandy soil of swale in prairie" in Aransas County. Cory calls it "occasional in woods along a small creek" in Ellis, "occasional in dense herbaceous vegetation in sand along the road" in Jefferson, "occasional in sandy fields" in Galveston, and "infrequent in open woods along creek" in Anderson County, while C. M. Rogers calls it "frequent" in Colorado County. Runyon reports that the plant "is very common in fields and open ground through this region" in Cameron County, while Warner found it in "transition black soil to sand, in red clay and sandy loam, prefers presence of clay" in Montgomery County.

Tharp, Turner, & Johnston found it inhabiting a "gumbo glade" (a local prairie on tight marly clay completely surrounded by pines on sand) in Polk County, McDougall in "old field weed stage" in Jefferson County, and the Lundells in "wet pineland along roadside" in Hardin County. Jones, Rowell, & Johnston (1961) state that it inhabits "swales, ravines, ditches, etc.", flowering in summer and fall.

In Louisiana the species was found by Shinnars "in yellow-gray clay on highway rights-of-way". It has been in cultivation in Europe since 1840. Common names reported for it are "Gulf vervain", "hoary vervain", and "vervain". C. L. Lundell 5047 is a low many-lobed form. Demaree 32009 in the Leiden herbarium shows a fasciated inflorescence.

The flower color of V. xutha is described as follows by various collectors: "lavender" -- Ferris & Duncan 3268, C. L. Lundell 11921 & 14135, and Lundell & Lundell 11522 & 13107; "blue-lavender" -- C. L. Lundell 14082; "lavender-blue" -- Shinnars 23982; "pale lavender-blue" -- Traverse 770; "bluish-lavender" -- C. L. Lundell 15082; "bluish-violet" -- F. B. Jones 2695; "gray-lilac" -- Kuntze 23811; "violet" -- Brenning s.n. [17.6.1904] & C. M. Rogers 6536; "purple" -- Tharp, Turner, & Johnston 54706; "pinkish-white with white throat" -- Traverse 2510.

This plant is often attacked by the fungi Cercospora papillosa Atk. and C. verbenicola Ellis & Ev. according to Seymour (1929). Material has been misidentified and distributed in herbaria under the names Verbena carolinense (Walt.) Gmel., V. carolinensis (Walt.) J. F. Gmel., V. caroliniana L., V. halei L., V. halei Small, V. hastata L., V. littoralis H.B.K., V. neomexicana (A. Gray) Small, V. officinalis L., V. polystachya H.B.K., V. scabra Vahl, V. stricta L., V. stricta Vent., Phyla incisa Small, Stachytarpheta sp., and even Lythrum californicum T. & G.

On the other hand, the F. B. Jones 1924, distributed as Verbena xutha, is actually V. brasiliensis Vell.; Edw. Palmer 1047 is V. canescens H.B.K.; Lindheimer III.500, McKelvey 1710, and E. D. Schulz 526, as well as E. J. Palmer 9183, are V. canescens var. roemeriana (Scheele) Perry; M. E. Jones 28296 is either V. canescens var. roemeriana or V. neomexicana var. hirtella Perry; M. E. Jones 29188, Molby 7221, and Williges 5c are V. cloverae Moldenke; A. M. Hildebrandt s.n., E. J. Palmer 9111 & 9485, and E. D. Schulz 103 are V. halei Small; H. H. Bartlett 10021, T. S. Brandegees s.n. [Hermosillo, May 14, 1892], and Wölflin s.n. [1845] are V. menthaefolia Benth.; E. L. Greene s.n. [Prinos Altos Mts., Aug. 23, 1880], S. S. Marsh 3099, C. H. Mueller 8138, and Tharp 4493 are V. neomexicana (A. Gray) Small; H. C. Hanson 645, Parks & Cory 7034, Perry, Bigelow, Wright, & Schott s.n. [Valley of the Rio Grande below Doñana], Shreve 9089, Tharp 3687, 8744, s.n. [Devine-Dilley, March 1, 1930], s.n. [Wilson Ranch, 6/19/31], & s.n. [6-19-31], and M. S. Young 101 are V. neomexicana var. hirtella Perry; Goodding 2246, Herb. LeRoy s.n. [Ariz. '84], LeSueur 875, Pringle s.n. [Santa Rita Mts., May 11, 1884], R. Runyon 55, Schery 32, and Wynd & Mueller 525 are V. neomexicana var. xylopoda Perry; C. T. Mohr s.n. [ballast ground, Mobile, 5/30/1887] is V. officinalis L.; E. C. Marsh 1378 is V. perennis Wooton; McKelvey 1756 is V. plicata Greene; and H. C. Hanson 496, F. B. Jones 1925, Killip 42107, R. Runyon 522, and Tharp 1201 are V. runyoni Moldenke, while the E. W. Nelson 6096, distributed as "Aff. V. halei or V. xutha" is V. pinetorum Moldenke.

C. C. Albers 33017, R. Runyon 1777, and L. F. Ward s.n. [Hearne, Sept. 11, 1877] are mixtures with V. halei Small; Bogusch 1235 is a mixture with V. scabra Vahl; and T. Drummond s.n. [New Orleans, 1832] is a mixture with Stylodon carneus (Medic.) Moldenke. Watson (1883) maintains that Edw. Palmer 2037 is "probably a hybrid between V. polystachya or V. urticaefolia and V. xutha", but I regard it as representing typical V. ehrenbergiana Schau.

H. Ness, in a letter to Dr. J. K. Small dated August 24, 1899, says "I also include in this letter a specimen of Verbena, to which I am unable to find anything agreeing. This plant I collected a month ago on sandy land in this county. Mr. Reverchon, who was along collecting, could not remember that he had ever seen this species before. It has the appearance of, and is often found in company with V. zutha but is much larger, 3--5 feet high, leaves broader, and the lower much less lobed than V. zutha. It is also more hairy, and bears larger flowers. If this species is a stranger to you I will send you better specimens. I would like to have your opinion on this plant.....[It] is a perennial, with somewhat sparsely branched stem." Dr. Small identified the plant as V. xu-

tha, and with this identification I fully agree.

Pellett (1947) reports that V. xutha yields nectar sparingly for honey in Texas. The Coulter reference given in the bibliography above is sometimes cited with the date "1894", which is incorrect for the page in question. The Appleman s.n. [Hot Springs] cited below does not actually have "Texas" on its label, but I am assuming that it was from that state, rather than from any of the localities with similar names in Arkansas, Montana, North Carolina, South Dakota, or Virginia.

Schauer (1847) cites Tainturier s.n. from Louisiana and Lindheimer s.n. from near Houston, Texas, in the DeCandolle Herbarium at Geneva and cultivated material in the Botanical Garden at Berlin. He comments "Hab. in America tropica. Conf. V. Ehrenbergiana."

Perry (1933) cites the following 35 additional specimens not as yet seen by me: ARKANSAS: Miller Co.: Eggert s.n. [Homan, 10 June 1898] (E); Letterman s.n. [Texarkana, Aug. 1881] (E). LOUISIANA: Cameron Par.: S. M. Tracy 8708 (E, F, G). Natchitoches Par.: E. J. Palmer 7556 (E). Orleans Par.: T. Drummond 253 bis (K). Rapides Par.: C. R. Ball 605 (E). Saint Martin Par.: Langlois s.n. [St. Martinsville, 30.V.1893] (E). Parish undetermined: T. Drummond s.n. (G); J. Hale s.n. (E, G). TEXAS: Austin Co.: Lindheimer 145 (E). Brazoria Co.: B. F. Bush 899 (E), 1275 (E). Brazos Co.: H. Ness s.n. [sandy land, Brazos Co., 1899] (G); J. Reverchon s.n. [College Station, 24 July 1899] (E). Gregg Co.: Eggert s.n. [near Longview, 7 June 1899] (E); J. Reverchon 2532 (E). Guadalupe Co.: Groth 187 (F, G). Harris Co.: J. Ball s.n. [Cypress City, May 1877] (E); Ferris & Duncan 3268 (E); Lindheimer 154 (E, G). Jackson Co.: J. A. Drushel 2842 (E). Jefferson Co.: Tharp 3166 (E). Montgomery Co.: Dixon 473 (F, G). Navarro Co.: J. Reverchon 2118 (E). Palo Pinto Co.: Lindheimer s.n. [Brazos, July 1899] (E). Travis Co.: E. D. Schulz 701 (W). Washington Co.: E. Hall 434 (E, F, G). The "Munz 1607" cited by her is undoubtedly the same collection cited by me as Munz 1601. She comments: "This species is easily distinguished by its erect habit, coarse pubescence, elongated open spike, and sessile commonly trifid leaves. It has often been confused with V. canescens var. roemeriana, but the latter is a smaller and more compact plant."

In all, 345 herbarium specimens and 2 mounted photographs, including type or phototype material of most of the names involved, have been examined by me.

Citations: ALABAMA: Mobile Co.: C. T. Mohr s.n. [Navy Cove, Aug. 1889] (W--771855). Montgomery Co.: Koepper, Justice, & Isely s.n. [Oct. 3, 1943] (Dp--38319). MISSISSIPPI: Harrison Co.: Demaree 32009 (Le); Small & Alexander s.n. [near Pass Christian, May

1931] (N). Hinds Co.: W. H. Rhoades s.n. [Jackson, July 1927] (Bt, N), s.n. [Jackson, 1927] (Bt--5921). Jefferson Co.: McDougall 1033 (W--1925220). Warren Co.: Moldenke & Woods 523 (B, Fg, S); W. H. Rhoades s.n. [Vicksburg, July 1927; H. N. Moldenke 17088] (Br, Bt, Bt--30141, Hs, N, St), s.n. [Vicksburg, July 1931] (N), s.n. [Battleground Bluff, 7-1931] (Bt--61221). ARKANSAS: Ashley Co.: Demaree 24518 (Lb--46760, Sm). Chicot Co.: Demaree 23265 (Sm). Cleveland Co.: Demaree 23313 (Z). Hempstead Co.: Demaree 44667 (Ca). Miller Co.: Eggert s.n. [along railroads, 10 June 1898] (N); Letterman s.n. [Texarkana s.n., 1881] (W--71977). LOUISIANA: Ascension Par.: T. L. Andrews s.n. [Ascension, 13-1] (Io--83618). Avoyelles Par.: A. R. Moldenke 724 (S); Penfound s.n. [May 16, 1946] (Tl). Beauregard Par.: A. R. Moldenke 707 (S). Bossier Par.: A. R. Moldenke 678 (S). Cameron Par.: S. M. Tracy 8708 (Es, Lb--27628, N, Tr, Up--50343, W--510600). East Baton Rouge Par.: Joor s.n. [July 6, 1874] (Mi). East Feliciana Par.: M. Carpenter s.n. [Feliciana, May 1840] (W--771857). Grant Par.: I. L. Forbes s.n. [Colfax, Aug. 20, 1927] (Ca--351574, Io--129293). Jefferson Par.: L. H. Bailey 7339 (Ba); L. E. Fox 2107 (Fx). Lafourche Par.: Arceneaux 93 (It). La Salle Par.: Shinners 23982 (Hi--197645, Tl). Natchitoches Par.: E. J. Palmer 7556 (Gg--182147, W--1531646). Orleans Par.: Brenning s.n. [17.6.1904] (B); Cocks s.n. [New Orleans] (Tl); T. Drummond s.n. [New Orleans, 1832] (Lu, S), s.n. [New Orleans, 1833] (Lu), s.n. [env. N. O.] (Vi); Holzer s.n. [New Orleans] (Mi); J. M. McArthur s.n. [7/21/28] (Tl). Plaquemines Par.: Langlois 123 (W--1323140), 612 (Cm), s.n. [July 1878] (Du--91128), s.n. [25 June 1884] (Al). Rapides Par.: C. R. Ball 605 (W--382844). Red River Par.: A. R. Moldenke 689 (S). Saint Charles Par.: Ewan 17704 (Tl). Saint James Par.: Small & Alexander s.n. [near Convent, Apr. 1931] (N). Saint Martin Par.: Correll & Correll 9447 (H--78927, N, No--18408); Langlois s.n. [St. Martinville, 30.V.1893] (Ba, I, I, N, W--1465963). Terrebonne Par.: Bynum, Ingram, & Jaynes s.n. [3 mi. w. of Cocodrie] (N); Munz 1601 (Po--124052). Parish undetermined: Dormon s.n. [1930] (N); Herb. Chapman s.n. [Louisiana] (C). TEXAS: Anderson Co.: Cory 54638 (No--15143, Rf). Aransas Co.: Cory 45878 (N), 45879 (Au, Sm), 51177 (Sm); M. C. Johnston 53253.1 (Au--122882), 53253.2 (Au--122883), 53253.3 (St); F. B. Jones 3195 (Ww); Uzzell 17 (Ar--123390). Austin Co.: F. W. Pennell 10279 (N); H. Wurzlow s.n. [Industry, 1891] (Ur). Bastrop Co.: B. H. Warnock 46439 (Au, N). Bell Co.: S. E. Wolff 829 (W--1622068), 1016 (W--1622581), 4364 (Tr). Bowie Co.: Letterman 394 (Du--91133), 5477 (N), s.n. [Texarkana] (W--986684). Brazoria Co.: B. F. Bush 899 (We); Kil-

lip 40591 (W--2005590). Brazos Co.: Garberson 293 (St); W. S. Jennings 155 (Ok); H. Ness s.n. [Aug. 1; Reeves 202] (Cs), s.n. [July 16; Reeves 203] (Cs), s.n. [Aug. 16; Reeves 205] (Cs), s.n. [July 1899] (N), s.n. [June 26, 1925] (Tr); H. B. Parks s.n. [6-7-47] (Au), s.n. [White Creek, 9-7-47] (S); Reeves 191 (N), 194 (Cs). Brewster Co.: Appleman s.n. [Hot Springs] (La). Burleson Co.: Trew 104 (Au--122827). Calhoun Co.: Harold Gentry 57 (Au, N, N). Cameron Co.: Clover 1695 (N); Mrs. Cottrell 8743 (Au); Ecology Class Univ. Texas s.n. [Palm Grove, 3.1.30] (Au); R. Runyon 1777, in part (Rr). Chambers Co.: Cory 50987 (Sm); Tharp s.n. [Anahuac, July 22, 1929] (Au, Au); Traverse 2510 (Au--208479). Colorado Co.: C. M. Rogers 6536 (Au--122826). DeWitt Co.: M. Riedel s.n. [7-4-41] (Au); E. D. Schulz s.n. [5/11/1938] (Wi); Webster & Rowell 7065 (Au, N). Ellis Co.: Cory 53386 (N). Fayette Co.: Matthes 13 [Macbride photos 34343] (Kr--photo, N--photo); B. H. Warnock 46297 (Au, N, S). Fort Bend Co.: Munz 1470 (Po--121658). Freestone Co.: Harding 399 (St--17058). Galveston Co.: Cory 51020 (N, Sm, Sm, W--1886098); Dapprich 7764, in part (Sm); G. L. Fisher 212 (W--1074640), s.n. [San Leon, July 7, 1929] (Bt--33687, Gg--290880); Mrs. A. F. Nelson s.n. [11-2-41] (Au); Parks & Cory 20201 (Tr). Goliad Co.: C. B. Williams 148 (Au). Gonzales Co.: C. C. Albers 46092 (Au, N); Bogusch 970 (Au), 1235, in part (Po--161325), 1351 [Herb. Univ. Texas 970] (W--1328540); Flemming s.n. [Rutledge Swamp, Oct. 9, 1934] (Au, Au); Parks & Cory 10068 (Tr); Tharp 253 (Au). Gregg Co.: J. Reverchon 2532 (N). Grimes Co.: Lynch s.n. [Plantersville, 10/28/31] (Au); J. N. Weaver 1039 (N); T. V. Weaver 1039 (Ml). Guadalupe Co.: Groth 187 (Dt, Gg--31432, Io--75837, N, W--717776). Hardin Co.: C. L. Lundell 14082 (N, Rf); Lundell & Lundell 11522 (N, Rf). Harris Co.: Armer s.n. [Houston, July 1927] (Au); L. H. Bailey 310 (Ba); Boll s.n. [Cypress City, May 1877] (E--117233); Boon 61 (Au), 291 (Au, N), 20001 (Au, N); Condit s.n. [Houston, June 19, 1909] (Ca--456149); O. Degener 5171 (Ms, N); Eifrig s.n. [Houston, June 1926] (Ca--882857, Mn--35073); Ferris & Duncan 3268 (Du--125419, Gg--31433, N); G. L. Fisher 82 (W--503153), 51048 (Ew, Go), s.n. [Houston, June 9, 1912] (Vi), s.n. [Houston, May 18, 1914] (Hp), s.n. [Houston, May 16, 1934] (Gg--237866); Fitzgerald 296 (Bl--42367); Joor s.n. [July 16, 1875] (Mi); Killip 45699 (W--2234120); Kuntze 23811 (N); W. H. Lewis 5300 (Nb); Lindheimer 1.154 (Ca--248431, W--1870923), s.n. [Houston, 1843] (Pr, W--1870846); Lundell & Lundell 13107 (N, Rf); C. T. Mohr s.n. [Harrisburg] (W--771856); O. Mueller 10-14 (Wi); E. D. Schulz 37-93 (Wi); Tharp 4498 (Au); Traverse 770 (Au--168129, Rf). Hays Co.: S. W. Stanfield s.n. [San Marcos and vicinity, summer 1898] (N). Jackson Co.: J. A. Drushel 2842

(Ur); A. R. Moldenke 207 (Fg); Tharp s.n. [8/30/41] (Au), s.n. [Sept. 27, 1941] (Au). Jeff Davis Co.: E. J. Palmer 34370 (N). Jefferson Co.: C. C. Albers 34005 (Au, Au); Cory 50962 (Sm), 50968 (N, Sm, Sm, W--1886083); Golub s.n. [Beaumont, July 8, 1938] (Ms); Kolthoff s.n. [4 Maj 1927] (S), s.n. [10/5/1927] (S); W. H. Long s.n. [Beaumont, May 28, '01] (Au); C. L. Lundell 14135 (N, Rf, W--1927002); Parks & Cory 19878 (Tr); Tharp 3166 (Au), 3167 (Au), s.n. [McFadden Beach, 9/10/37] (Ca--882855), s.n. [McFadden Beach, 9/11/37] (Au, Au, N, Pl--151555, W--1873784), s.n. [9/12/37] (Au, Au); M. S. Young s.n. [Port Arthur, 4/21/18] (Au). Kaufman Co.: E. Hamby 1285 (Ar--206803). Lavaca Co.: G. L. Fisher 122 (W--503192). Lee Co.: J. F. Brenckle 48076 (N), 49075 [48075] (N). Leon Co.: E. C. Smith s.n. [Oakwood, 5-12-1942] (Fc). Liberty Co.: F. W. Gould 6922 (Au--122868); Harding 172 (St--17565); C. L. Lundell 15082 (Rf, W--2297897). McLennan Co.: L. D. Smith 649 (Au--122873, St). Milam Co.: S. E. Wolff 4023 (Tr). Montgomery Co.: Dixon 473 (N); Warner s.n. [Willis] (Hu). Navarro Co.: J. Reverchon 2118 (W--387015); Lloyd Williams 47 (Au). Polk Co.: Tharp, Turner, & Johnston 54706 (Au--122904, St). Refugio Co.: A. R. Moldenke 199 (Fg, S). Robertson Co.: L. Morris 42 (Au); F. J. Tyler s.n. [Calvert, May 13, 1904] (W--500804); L. F. Ward s.n. [Hearne, Sept. 11, 1877] (W--147568). San Patricio Co.: F. B. Jones 4056 (Ww). Travis Co.: F. A. Barkley 13365 (Au, N); Cohn & Barkley 13253 (N); L. C. Hinckley 1403 (N); C. L. Lundell 11921 (N, Rf, Rf, Rf); R. H. Painter 16 (Ka--71742); E. D. Schulz 679 (W--1104945, Wi, Wi), 700 (Wi); Strandtmann s.n. [July 26, 1940] (Au); Tharp 667 (Au, Au, W--1104641, Wi), 668 (Au, W--1104642, Wi), s.n. [Walnut Cr., 7/12/20] (Io--104882), s.n. [Walnut Creek, spring 1921] (Io--104881), s.n. [8-7-40] (Au); York, Copeland, & Johnson 6048 (Au). Tyler Co.: Tharp, Turner, & Johnston 54838 (Au--122903, St). Victoria Co.: F. B. Jones 2695 (Ww); F. L. Lewton 765 (Ar--271725); E. D. Schulz 2495 (Gg--162244, Wi). Walker Co.: Albers & Warnock 45136 (Au, N); Parks & Cory 10437 (Tr); Tharp s.n. [6/11/35] (Ca--882856, Vi); Warner s.n. (Au, W--1114303). Waller Co.: W. H. Lewis 5372 (Nb); H. B. Parks 2432 (Au). Washington Co.: C. C. Albers 33013 (Au), 33017, in part (Au); Brackett 253 (Au), s.n. [Apr. 21, 1939] (Au); Gander 7596 (Sd--25483); E. Hall 434 (N, Po--70981, Pr, W--71996). Wharton Co.: J. A. Drushel 10435 (N); A. R. Moldenke 210 (Fg); E. J. Palmer 6622 (Po--217660, W--1581013). Williamson Co.: Whitehouse s.n. [Cedar Park, July 8, 1929] (Au, Au). High Island [Galveston Co.]: O. M. Clark 3944 (B). County undetermined: Belfrage s.n. [28.4.1860] (S); Herb. Univ. Texas s.n. (Au, Au); Kuntze s.n. [Aug. 1904] (N); Lindheimer s.n. [Fasc. IV, 1849] (Ka); H. Ness 144 (Tr, Tr, Tr, Tr, Tr, Tr, Tr, Tr, Tr, Tr, Tr, Tr,

Tr, Tr, Tr), s.n. (Tr). ARIZONA: Cochise Co.: R. D. Camp 2611 (Wi). CULTIVATED: Belgium: M. Martens s.n. [h. b. Lov. 1840] (Br). New York: G. V. Nash s.n. [1903; N. Y. Bot. Gard. Cult. Pl. 18690] (N); N. Taylor s.n. [1904; N. Y. Bot. Gard. Cult. Pl. 18690] (N). Texas: E. Hall s.n. (W--71979). LOCALITY OF COLLECTION UNDETERMINED: McKay 2109 (S).

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BOOK REVIEW

Alma L. Moldenke

"Algal Cultures and Phytoplankton Ecology", by G. E. Fogg, xiii + 126 pp., illust. The University of Wisconsin Press, Madison, Wisconsin. [1964] 1965. \$5.50

Now readers will have the same privilege of learning about this information as did the listeners to Dr. Fogg's lectures in '63 [from which this excellent book is compiled] at the University of Wisconsin.

In the "introduction" the author explains how laboratory controlled physiological and biochemical studies of culturing truly phytoplanktonic algae can offer much to interpreting the detailed observations made in natural bodies of fresh and salt water.

He continues with "the characteristics of algal growth in cultures of limited volume", emphasizing the factors that even the limiting container provides, the fact that no truly planktonic form is known to survive in the dark even with supplemented substrates, and the conclusion that there is no single criterion for measuring growth.

Next he explains "the growth of algae in continuous and synchronous cultures" using the Myers and Clark turbostat and the Monod chemostat for studying population density in controlled media.

In describing "metabolic patterns and growth", the author mentions how different species tend to resemble each other in the relative amounts of their organic nutrients when grown under similar conditions, even though it is known that algal groups are characterized by particular pigments, carbohydrates, sterols, etc.

Among "the general features of the phytoplankton growth in lakes and the sea" is most prominent their patchy horizontal and vertical distribution with the growth rate of the biomass varying greatly with cell size, etc.

"The increase of phytoplankton in temperate waters in the spring" is the most dynamic feature of this ecology, arising from the increase and intermingling of holoplanktonic types always in the water and of meroplanktonic types emerging from resting stages in bottom deposits.

"Some other aspects of phytoplankton periodicity" are discussed. The "distribution and seasonal succession" of the various organ-